FISCAL NOTE

FOR PROPOSED AMENDMENTS TO THE NEUSE & TAR-PAMLICO NUTRIENT STRATEGY RULES

DECEMBER 12, 2018

Rule Citation Numbers

Rule		Proposed Action
2B .0229	Tar-Pam Non-Association	Readopt w/Amendment
2B .0232	Neuse Purpose & Scope	Readopt w/Amendment
2B .0234	Neuse Wastewater	Readopt w/Amendment
2B .0235	New Development Stormwater	Readopt w/Amendment
2B .0236	Agriculture Goals	Repeal
2B .0237	BMP Rate	Repeal
2B .0238	Agriculture	Readopt w/Amendment
2B .0239	Nutrient Management	Repeal
2B .0240	Nutrient Offset	Readopt w/Amendment
2B .0255	Agriculture Goals	Repeal
2B .0256	Agriculture	Readopt w/Amendment
2B .0257	Nutrient Management	Repeal
2B .0258	New Development Stormwater	Readopt w/Amendment
2B .0701	Definitions	Adopt
2B .0703	Tar-Pamlico Purpose & Scope	Adopt

Rule Topic: The Neuse & Tar-Pamlico Nutrient Management Strategy Rules are two comprehensive sets of rules designed to address excess nutrient inputs resulting in water quality problems in the Neuse and Tar-Pamlico estuaries.

DEQ Division: Division of Water Resources

Staff Contacts:

John Huisman, Environmental Program Consultant, DWR
john.huisman@ncdenr.gov
(919) 707-3677

Jim Hawhee, Environmental Program Consultant, DWR
jim.hawhee@ncdenr.gov
(919) 707-3675

Rich Gannon, NPS Planning Branch Supervisor, DWR
rich.gannon@ncdenr.gov
(919) 707-3673

Impact Summary:	State government:	Yes	Federal government:	No
	Local government:	Yes	Private entities:	Yes
	Substantial Impact:	Yes		

Necessity: N.C. General Statute (G.S.) §150B-21.3A *requires* state agencies to review existing rules every 10 years, determine which rules are still necessary, and either re-adopt or repeal each rule as appropriate. The proposed rulemaking satisfies these requirements for a portion of the Department's rules.

Table of Contents

Post-Comment Period Update – August 30, 2019

This document has been updated to include supplemental analyses in response to public comments received between February 15th and April 16th, 2019. More specifically, there were numerous comments regarding the validity of this Fiscal Note from the regulated community and other state programs. This update is provided as clarification related to some of the concerns provided in the comments, and is done so in accordance with the North Carolina Administrative Procedures Act.

A number of commenters from the regulated community objected to the Fiscal Note's reliance on the US EPA 2003 Credit Trading Policy (also referred to as the "2003 trading memorandum"). The EPA released an update to the 2003 trading memorandum on February 6th, 2019 entitled "Updating the Environmental Protection Agency's (EPA) Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality" (also referred to as the "2019 trading memorandum"). The date of EPA's official release of the document occurred after the EMC's approval to go to public hearings and just prior to the February 15th to April 16th, 2019, comment period.

The public is referenced to the full document at the US EPA's website: https://www.epa.gov/sites/production/files/2019-02/documents/trading-policy-memo-2019.pdf.

The Hearing Officers note the following two paragraphs from the 2019 trading memorandum as being impactful in clarifying the EPA's guidance from the 2003 trading memorandum:

> *"A detailed and prescriptive set of recommendations may have been preferred when the EPA issued the 2003 Policy. However, in the intervening fifteen years nonpoint pollution reduction technologies and practices have improved, research has helped inform the effectiveness and performance of many nonpoint practices, technical mapping and robust modeling programs have become capable of evaluating resources at the edge-of-field and at the landscape scale, and in-stream and other monitoring approaches have expanded our understanding of the resources we are working to protect. These significant advances in resource management tools have created an opportunity for the Agency to modernize its water quality credit trading policies. The EPA acknowledges that some small-scale market-based projects have successfully implemented recommendations from the 2003 Policy and supports the continued application of the 2003 Policy for those projects. The Agency may consider future stakeholder engagement to determine the continued utility of the 2003 Policy. To facilitate broader adoption of the market-based programs in the near-term, the Agency is now announcing some "Market-Based Principles that are designed to encourage creativity and innovation in the development and implementation of market-based pollutant programs.*
>
> *The EPA Further understands the 2003 Policy has been interpreted by many states, tribes, and stakeholders as having the force and effect of law, mandating certain actions and outcomes, and containing standards or requirements with which a market-based program must comply. Like all agency guidance documents, the 2003 Policy provides recommendations to states, tribes, and stakeholders, but the Agency cannot mandate any specific regulatory action, outcomes or requirements without first going through the rulemaking process. This memorandum is intended to provide ideas and opportunities for states, tribes, and stakeholders to consider as they develop market-based water quality improvement policies."*

Commenters from the regulated community stated that the EPA does not require a specific credit trading ratio for point to non-point credit trading, either in the 2003 or 2019 credit trading documents, and that the Fiscal Note implies that a specific credit trading is needed to comply with EPA standards. The Hearing Officers and DEQ acknowledge that no specific ratio is required by EPA.

Commenters from the regulated community also expressed concern that credit trading within the Neuse River Compliance Association was not effectively occurring, regardless of the "paper" amount of available point to point credits, and that Fiscal Note fails to account for the realistic potential need for an affordable point to non-point credit trading scenario. DEQ notes that a quantitative analysis was provided on the acquisition of both allocation and offset credit, including for a broad range of policy alternatives, and that this analysis satisfied APA requirements. DEQ supports making offset credits as affordable as possible so long as water quality protection is assured.

The NC Division of Mitigation Services and the NC Stewardship Program, which holds the State's mitigation properties, expressed concern that the wording of the rules created a perpetual maintenance requirement for the State that was not reflected in the Fiscal Note. DEQ notes that the rule language is based on the market-standard and most cost-effective practice for generating nutrient offset credit, agricultural buffer restoration, and that this continued practice does not require perpetual maintenance and is the basis of the Fiscal Note. The rules have been clarified to reflect that the State Stewardship Program is not required to accept engineered stormwater control measures (SCMs) and the associated perpetual maintenance related to them. Therefore, additional costs for maintenance by the State is not required in the current version of the rules.

CHAPTER 1 EXECUTIVE SUMMARY

The Neuse and Tar-Pamlico nutrient strategies are designed to equitably reduce nutrient loading from various sectors to eliminate excess algal production and resulting algal-related impairments in two of North Carolina's most environmentally and economically important estuaries. Both strategies were implemented at the turn of the century with minimal amendments since that time, and both reached steady state implementation by 2003 (Neuse) or 2006 (Tar-Pamlico). Since then, neither estuary has recovered and initial gains have diminished. Thus, the statutorily-required rules readoption process presents an opportunity to revisit these rules to better address the regulatory objective as required by the Administrative Procedures Act, incorporating practical knowledge gained during strategy implementation and from scientific advances in many fields.

Most proposed changes to the rules do not have significant financial or environmental implications. However, some proposed amendments will incur either financial benefits or new regulatory costs. Where new costs are incurred, Division staff considers these revisions necessary, equitable, fiscally reasonable, and consistent with nationwide norms. These changes are necessary to prevent potentially significant further water quality degradation resulting from regulatory gaps that were unintended at the time of their implementation.

The most significant changes made within these rules address the wastewater and new development sectors. Also, the nutrient offset rule, which applies to all nutrient strategies, has been updated. Minor substantive changes have been made to other rules including those governing cropland agriculture. Finally, rules mandating education for professional fertilizer applicators have largely run their course and are proposed for repeal, as are a few other rules with minor environmental implications. Riparian buffer protection rules, an integral part of both nutrient strategies, are being amended under a separate, contemporaneous rulemaking process.

Wastewater rule changes, evaluated in Chapter 4, affect only the means by which new and expanding facilities are permitted for increased nutrient loads within these nutrient-impaired basins. It is difficult if not impossible to reliably predict when, where, and to what degree new and expanding wastewater facilities will require allocation or offset credits at the basin scale. To better illustrate the effects of changes to these rules, various realistic permitting scenarios were analyzed at the facility scale. These scenarios are presented in the individual rule chapters and estimate the incremental costs or cost savings for a new or expanding discharger to acquire allocation or offset credits under the proposed wastewater and offset rules.

In the proposed Neuse wastewater rule, better synchronized timing between offset requirements and new permitted loads provides potential cost savings under the offset credit option while still ensuring that new loads are effectively offset. No new costs are incurred.

In the proposed Tar-Pamlico wastewater rule, all facilities would gain a clear regulatory path to utilize both allocation trading and the existing nutrient offset credit market. At projected market rates, newly allowed allocation leases provide a more cost-effective option to Tar-Pamlico dischargers than currently required nutrient payments. Tar-Pamlico Basin Association members are provided with clear regulatory options for expansion, which do not exist within the Phase IV Tar-Pamlico Basin Agreement. However, a new treatment efficiency standard, and thus the rule as a whole, potentially incurs additional costs for new and expanding non-association dischargers compared to the existing rule. This change is incorporated for several reasons including advancements in wastewater treatment technology since this rule was implemented in 1997, the fact that total nutrient loading to the estuary remains above TMDL levels, and the consideration that domestic expansions in this basin appear to be unlikely for twenty years or more.

The nutrient offset rule, evaluated in Chapter 5, has been restructured and expanded upon since its last amendment in 2010. Many changes were introduced to codify existing policy and provide regulatory certainty for

offset credit providers. The rule was also restructured to reflect the chronological process of generating and then transacting nutrient offset credits. Several changes were introduced to expand or improve the utility of nutrient offset credits. These provisions include explicit recognition of developer and NPDES permittee-generated offset options as well as a new pathway to generate permanent nutrient offset credits. An option to allow or prohibit nutrient and stream mitigation credit stacking is provided for the Commission's consideration. Finally, the Water Quality Committee incorporated changes in May 2018 that reduced the existing 2:1 point to nonpoint source ratio down to 1.1:1. This change reduces confidence that wastewater nutrient load increases will be adequately offset, allows increased nutrient loading compared to the existing rule, and potentially risks EPA or third-party intervention.

The Neuse and Tar-Pamlico new development stormwater rules are evaluated in Chapter 6. Both rules propose to add jurisdictions, many of which have experienced significant population growth trends, addressing a growing gap that will help mitigate against further nutrient increases. Both rules also propose to address an unintended gap in onsite treatment requirements, stipulating treatment when development reaches 24% built-upon area, which invokes minimum statewide MS4 rule requirements. Finally, through the Stormwater Nitrogen and Phosphorus (SNAP) tool, the rules incorporate the latest developments in stormwater science and expand the suite of stormwater control measures and design variations available to developers to reflect DEMLR rule changes and guidance.

Costs of the proposed stormwater rules were calculated for all affected parties. Table 1-1 summarizes costs and cost savings across all rules for each of the following parties: private, state, federal, and local government. Appendix Table A-9 details costs and cost savings for developers. These cost projections are presented using Net Present Values (NPV), a process that accounts for the time value of money, discounting future projected cost amounts to the value they would have in the present.

The combined total costs and cost savings to developers for 10 years of stormwater rule implementation across 31 Neuse and 14 Tar-Pamlico communities are estimated at $30.1 and $10.3 million respectively. Possible cost ranges are also provided to characterize theoretical extremes driven by choice of stormwater control measures. Costs are driven largely by requirements to treat stormwater onsite above minimum development intensity thresholds.

The proposed stormwater rule revisions will provide direct nutrient loading benefits and, arguably more important, substantial hydrologic improvements that in turn will yield secondary nutrient loading benefits. Both nutrient and hydrologic benefits are detailed in the stormwater chapter and compiled in Appendix Table A-10. Direct nutrient loading improvements will occur on development in both current and proposed new communities. New Neuse communities, which currently require treatment under Phase II and other regulations, will for more intensive development require additional reductions to meet the nitrogen target, which may be met through offsets or additional treatment, while new Tar communities, which currently require no stormwater controls, will require onsite treatment and full compliance with nitrogen and phosphorus targets. Net load reduction benefits will occur under current programs as a result of the shift to more onsite treatment and the relatively greater certainty of load reductions achieved in that manner relative to the prevailing offset practice.

Development in both current and proposed communities will contribute to large runoff, or hydrologic, benefits quantified in Table 1-2 (and detailed in Table A-10). In current communities, closing an unintended regulatory gap will increase the use of onsite treatment, resulting in 670 new treated ac/yr in Neuse and 220 new treated ac/yr in Tar current communities, providing a combination of runoff elimination and detention with slowed release of remaining runoff. Treatment required in proposed new communities will provide both pollutant reduction and hydrologic benefits.

Rule cost estimates are summarized in Table 1-1. Benefit estimates are provided in Table 1-2. Detailed cost and benefit discussions with methods descriptions and assumptions are provided in individual rule chapters.

TABLE 1-1 COSTS & COST SAVINGS TO AFFECTED PARTIES – IN NET PRESENT VALUE DOLLARS OVER 10 YEARS

Rule	Private (Over 10 Years)	Local Government (Over 10 Years)	Local Government One-time Opportunity Cost	State Government (10 Years)	State Government One-time Opportunity Cost
New Development Neuse	$30.1M *(Most Likely)* ($14.3M) - $119.2 *(Possible Range)*	$2.3M *(Most Likely)* ($1.2M) - $9.6M *(Possible Range)*	$253k	$97K	$34K
New Development Tar-Pamlico	$10.3M *(Most Likely)* $7.8M - $27.2M *(Possible Range)*	$446K *(Most Likely)* $378K - $1.3M *(Possible Range)*	$85k	$55K	$29K
Neuse Wastewater	NQ[1,2]	$0[1,3]	$0	$0*	$0
Tar-Pamlico Wastewater	NQ[1,4]	$0[1,5]	$0	$0*	$0
Nutrient Offset	NQ[6]	NQ[6]	$0	NQ[7]	$0
Neuse Goals	$0	$0	$0	$46K	$0
Tar-Pamlico Goals	$0	$0	$0	$46K	$0
Total	**$40.4** *(Most Likely)* **($6.5M)- $146.4** *(Possible Range)*	**$2.7** *(Most Likely)* **($822K) -$10.9M** *(Possible Range)*	**$338K**	**$244K**	**$63K**

Notes:

Annual costs show over 10 years in Net Present Value (NPV) dollars

NQ = potential costs or savings present but not quantified at basinwide scale

[1]Cost estimates are scenario-based rather than basinwide and extend beyond 10 years.

[2]Potential savings may be realized by industrial dischargers within 10 years, but the timing and location of these events is uncertain.

[3]Potential savings may be realized for domestic wastewater facilities after 10 years.

[4]Potential costs may be incurred by new or expanding industrial dischargers, but the timing and location of these events is uncertain.

[5]Potential costs may be incurred for domestic wastewater facilities after 10 years..

[6]Unquantified offset costs potentially associated with stream/nutrient stacking option, rule benefits are also unquantified apart from their inclusion in the wastewater rule analyses.

[7]Unquantified costs associated with potential intervention regarding the proposed point to nonpoint source trading ratio of 1.1 to 1.

The hydrologic benefits of stormwater treatment importantly protect receiving streams in developed areas from the destabilizing effects of flashy stormflow. Unstable streams become sources of sediment and nutrients to downstream impoundments and estuaries, so the protection afforded streams through treatment provides this secondary nutrient, sediment and other pollutants benefit. Stream protection also benefits property values,

retaining these natural amenities that can otherwise become eyesores, safety hazards and literally result in loss of land from bank erosion.

Nutrient benefits are affected by two factors with real but countervailing effects on loading. The first factor is the change in accounting tools, while the second is the shift in emphasis from offset reductions to primarily onsite treatment. Analysis of these two factors provided in the stormwater chapter estimates a net positive effect on nitrogen load reduction benefits.

In addition to quantifying direct stormwater rule benefits in Table 1-2 to accompany the above cost estimates, the analysis provides a qualitative overview of the various non-market environmental and social benefits resulting from nutrient management in and around the Neuse and Pamlico estuaries.

Excessive nutrient inputs can have many negative effects on the estuarine ecosystem and the human communities that benefit from them, thus these ecosystems and communities realize benefits from the responsible management of nutrient inputs. The value of environmental benefits attributable to these proposed rule amendments was not monetized because the magnitude of the associated estuarine response would be difficult to quantify. However, a qualitative discussion of the environmental benefits of the proposed rules is included in Chapter 3 of this document to provide context and scale for the tangible benefits that result from addressing nutrient impairments in the Neuse and Tar-Pamlico estuaries.

The directly quantifiable nutrient and hydrologic benefits of the proposed New Development Stormwater Rules are summarized in Table 1-2 below along with the qualitative environmental benefits of all proposed rules. Stormwater rule benefits are detailed in Chapter 6.

TABLE 1-2 SUMMARY OF ENVIRONMENTAL BENEFITS

	Nitrogen Reductions (lbs/yr)	Phosphorus Reductions (lbs/yr)	Stormwater Runoff Eliminated (ft3/yr)	Stormwater Runoff Detained (ft3/yr)
Neuse Basin	654-774 *(Most Likely)*	0 *(Most Likely)*	6.4M *(Most Likely)*	28.5M *(Most Likely)*
	(610 – 818) – (4,178 – 4,928) *(Possible Range)*	0 – 354 *(Possible Range)*	6.4M - 110M *(Possible Range)*	(81M)[a] – 112M *(Possible Range)*
Tar-Pamlico Basin	231-251 *(Most Likely)*	15 *(Most Likely)*	2.4M *(Most Likely)*	10.9M *(Most Likely)*
	(214 – 266) – (776 – 870) *(Possible Range)*	15 -27 *(Possible Range)*	2.4M – 12.8M *(Possible Range)*	(479K)[a] – 20.2M *(Possible Range)*
Qualitative Environmental Benefits* (Neuse & Tar-Pamlico)				
Recreational Benefits	**X**			
Local Economy & Property Values	**X**			
Watershed Stream Improvement	**X**			

Aquatic Life Benefits	**X**
Ecological Food Communities	**X**

Notes:

a: Negative values for detained runoff represent detention being lost in favor of total runoff elimination achieved by infiltration. Positive values in the accompanying Runoff Eliminated category reflect this shift.

* : While these benefits will occur, we are unable to quantify them (See Chapter 3)

CHAPTER 2 FISCAL NOTE INTRODUCTION

Nutrient pollution, in the form of excess nitrogen and phosphorus inputs, remains one of North Carolina's most challenging water quality issues. Nutrients stem from sources like wastewater treatment plants and stormwater that flows over rooftops, roads, lawns, and farm fields. Nutrients are required by all forms of life, but in excess they feed overabundant and potentially toxic algal blooms and a host of related water quality problems including fish kills, skin irritation for swimmers, and drinking water taste and odor issues.

To address this over-enrichment, the Division of Water Resources leads the development, implementation, and oversight of regulatory nutrient management strategies to restore North Carolina's most valuable waters. Comprehensive and customized strategies are in place to restore the Tar-Pamlico and Neuse Estuaries as well as Falls and Jordan Lakes. The strategies are designed to equitably reduce nutrient loading from different regulated sectors and eliminate ongoing chlorophyll *a* impairments, the yardstick for excessive algal growth.

The Neuse and Tar-Pamlico Estuary management strategies have been in place for 21 and 18 years, respectively. They have resulted in some modest successes, including nitrate loading reductions in both river basins despite significant population increases. However, while all regulated sectors continue to meet their obligations in these watersheds, full restoration of these estuaries has not been attained and total nutrient loads have been trending upward in recent years.

The statutorily-required rules readoption process provides an opportunity to revisit these rules, incorporating practical knowledge gained during strategy implementation and scientific advances in many fields. The state of knowledge has been summarized in many Division-authored reports, including basin plans prepared for the Neuse and Tar-Pamlico River Basins. Despite general scientific advancements and focused management evaluations in these basins, the sources responsible for recent nutrient-related water quality declines have not been firmly identified. Therefore, rather than seeking to regulate new topical areas or increasing stringency within current regulatory domains, the draft rules largely seek to maintain existing substantive protections as further investigations continue.

Most proposed changes to existing rules do not have significant financial or environmental implications. They were proposed to improve consistency between state programs and incorporate updated accounting methodologies and science to better track implementation progress. They also codify long-standing program procedures in addition to making needed technical changes such as updating references, renumbering, and reorganizing rule text to aid understanding.

However, some proposed amendments to the rules in this package will incur either financial benefits or new regulatory costs. Where the Division has proposed rule changes resulting in financial benefits, these result from an improved regulatory process and the incorporation of new scientific information rather than a decline in water quality protections. Where new costs are incurred, Division staff considers these revisions necessary, equitable, fiscally reasonable, and consistent with nationwide norms. These changes are necessary to prevent potentially significant future water quality degradation resulting from regulatory gaps that were unintended at the time of their implementation.

This fiscal note addresses the proposed rulemaking package with updates to the current Neuse and Tar-Pamlico Nutrient Management Strategy rules in accordance with G.S. 150B-21.3A, "Periodic Review and Expiration of Existing Rules", which directs state agencies to review and update their rules every 10 years. The rule revisions

presented in this analysis have undergone several stakeholder reviews beginning with a series of meetings in 2015 and yielding additional revisions discussed at follow-up meetings through October 2017.

2.1 NEUSE RIVER BASIN ESTUARY NUTRIENT MANAGEMENT STRATEGY

Eutrophication became a water quality concern in the lower Neuse River basin in the late 1970s and early 1980s. Nuisance algal blooms prevalent in the upper estuary prompted investigations by DWQ. These investigations, as well as other studies, indicated that algal growth was being stimulated by excess nutrients entering the estuarine waters of the Neuse River. In 1988 the lower Neuse River basin received the supplemental classification of nutrient sensitive waters (NSW). As part of this early nutrient strategy, new and expanding NPDES discharges, as well as existing facilities with design flows greater than 0.05 MGD, were given a quarterly average phosphorus limit of 2 mg/l. Phosphorus loading was greatly reduced and algal blooms in the river and freshwater portions of the estuary were reduced as a result of this action.

The 1993 Neuse Basinwide Water Quality Plan recognized that eutrophication continued to be a water quality problem in the estuary below New Bern. Extensive fish kills in 1995 prompted further study of the problem. Low dissolved oxygen levels associated with algal blooms were determined to be a probable cause of many of the fish kills. Researchers also identified the presence of a toxic dinoflagellate, *Pfiesteria piscida*, that contributed to many of the fish kills.

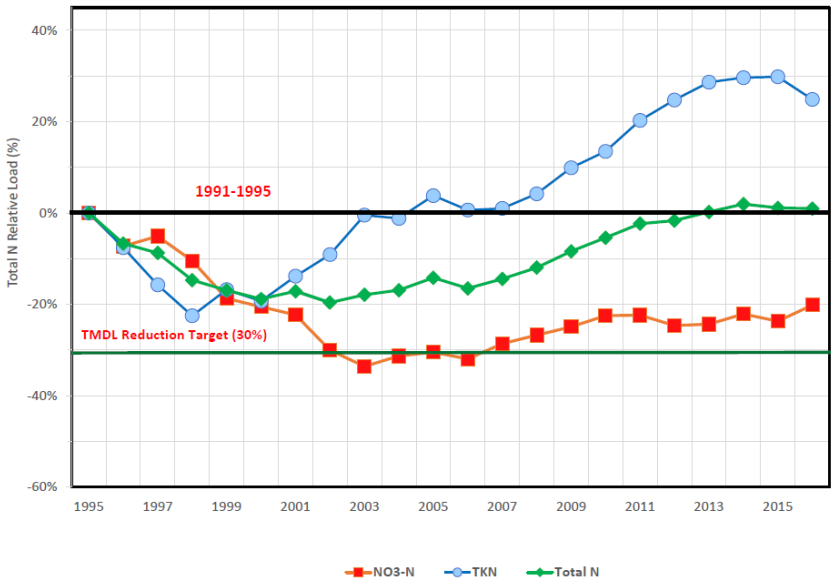
The algal blooms and correspondingly high levels of chlorophyll *a* prompted DWQ to place the Neuse River estuary on the 1994 303(d) list of impaired waters. In 1996, the NC Senate Select Committee on River Water Quality and Fish Kills sponsored a workshop with numerous scientists familiar with the Neuse River water quality problems. The group reached consensus that a 30 percent reduction in total nitrogen entering the estuary was a good starting goal to reduce the extent and duration of algal blooms. In 1996, the 30 percent reduction was put into law (Session Laws 1995, Section 572). A Total Maximum Daily Load (TMDL) was developed in two stages and approved by EPA in 2002 to address the nitrogen overloading to the estuary. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. The TMDL developed for the Neuse estuary showed a minimum of 30% reduction in nitrogen loading is needed. This equates to a total load of 6.75 million pounds of nitrogen from all sources.[1]

To address the mounting problems in the Neuse River estuary, the Environmental Management Commission (EMC) adopted a comprehensive set of permanent rules that became effective August 1, 1998 as the Neuse Nutrient Strategy. The intent of these rules was to reduce nitrogen inputs, from both point and non-point sources, to the estuary by 30% from the 1991-1995 baseline. While individual implementation dates varied, all of the rules were fully implemented by 2003.

[1] North Carolina Department of Environment and Natural Resources. Phase II of the Total Maximum Daily Load for Total Nitrogen to the Neuse River Estuary, North Carolina. 2001. Accessed October 2, 2018 at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/FINAL%20TMDLS/Neuse/Neuse%20TN%20TMDL%20II.pdf.

On implementation of the rules, flow-adjusted total nitrogen levels fell by about 20% by 2002. Flow-adjusted statistics are used to account for substantial annual variability attributable to rainfall and are measured at the compliance point at Fort Barnwell. Since 2002, total nitrogen levels have crept back up to baseline levels. However, while inorganic nitrogen levels have seen only slight increases, total Kjeldahl nitrogen (comprised of ammonia and organic nitrogen) has risen as much as 30% above baseline levels.

FIGURE 2-1 FLOW-NORMALIZED NITROGEN LOADS (% VS. 1991-1995), NEUSE RIVER AT FORT BARNWELL



2.2 TAR-PAMLICO RIVER BASIN ESTUARY NUTRIENT MANAGEMENT STRATEGY

During the 1970s and 1980s, incidences of fish kills and diseases, nuisance algal blooms, loss of aquatic vegetation, and other nutrient-related problems increased in the Pamlico estuary. In response, the EMC designated the entire Tar-Pamlico River Basin as "Nutrient Sensitive" in December 1989 and called for a strategy to reduce nutrient inputs within the basin.

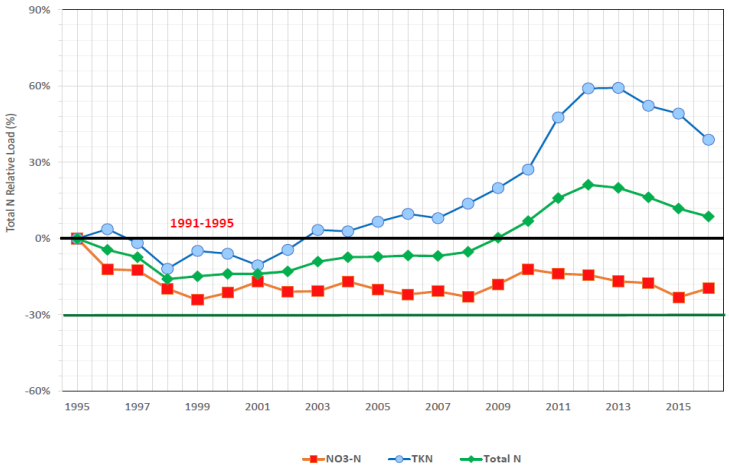
In the first phase, point sources successfully reduced discharge nutrient loads under an innovative 'trading' program. The second phase established estuary-based goals of a 30% reduction in nitrogen loading and no increase in phosphorus loading relative to a 1991 baseline condition, continued the point source caps and offset program, and called on nonpoint sources to voluntarily meet the loading goals. In 1998, the EMC initiated rulemaking to implement nonpoint source goals. Modeled after rules implemented in the adjacent Neuse River Basin in 1998, a set of rules addressing four areas (agriculture, urban stormwater, riparian buffers, and fertilizer management) went into effect during 2000 and 2001.

The rules called for a 30% reduction of nitrogen inputs to the estuary from major sources, including both wastewater and runoff pollution. That corresponds to a total maximum daily load of approximately 3 million lbs/yr TN and 400,000 lbs/yr TP.[2] The rules called for no increase in phosphorus load compared to a baseline year of 1991. As part of the overall strategy, nitrogen and phosphorus loading caps for an association of fifteen point source dischargers, the Tar-Pamlico Basin Association, are implemented under a nutrient control agreement.

The EMC adopted a comprehensive set of permanent rules effective April 2001 to implement the Tar-Pamlico Nutrient Strategy. While individual implementation dates varied, all rules were fully implemented by 2006.

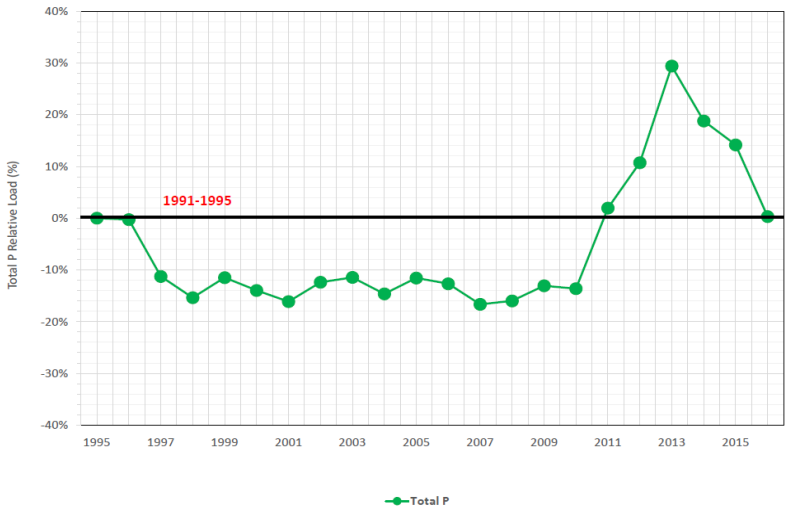
As with the Neuse basin, significant nutrient declines began upon implementation of the Tar-Pamlico strategy, but nutrient inputs to the estuary subsequently reversed and have been above background levels since 2011. Flow-adjusted statistics are used to account for substantial annual variability attributable to rainfall and are measured at the compliance point within the basin: a flow gage near Grimesland. Inorganic nitrogen levels remain below baseline, but substantial increases in organic nitrogen have driven an upward trend in total nitrogen. Also, while modest phosphorus reductions were consistent until 2010, a major spike and then decline have since occurred.

FIGURE 2-2 FLOW-NORMALIZED NITROGEN LOADS (% VS. 1991-1995), TAR RIVER NEAR GRIMESLAND



[2] N.C. Department of Environment and Natural Resources. Tar River TMDL. 1994. The actual TMDL is provided in metric units: 1,361,000 kg/yr TN and 180,000 kg/yr TP.

FIGURE 2-3 FLOW-NORMALIZED TOTAL PHOSPHORUS LOAD (% VS. 1991-1995), TAR RIVER NEAR GRIMESLAND



2.3 SUMMARY OF COSTS & COST SAVINGS TO AFFECTED PARTIES

A brief summary of costs and cost savings across the set of rules is provided here. A full discussion of costs associated with each rule is provided in the respective chapters.

Given the long-term nature of these rules, cost projections are presented using Net Present Values (NPV), a process that takes into account the time value of money, discounting future projected cost amounts to the value they would have in the present. Future costs are based on current costs grown at the rate of inflation. In general, the long-term nature of these rules and the rapidly evolving field of watershed restoration combine to make projection of costs more than a few years into the future increasingly speculative. Costs estimated in this document generally represent conservative, upper estimates based on current information and technology.

Costs were calculated for all affected parties. Table 2-1 summarizes costs across all rules for each of the following parties: private, state, federal, and local government. Detailed costs are provided in the individual chapters.

The combined total costs and cost savings to developers for 10 years of stormwater rule implementation across 31 Neuse and 14 Tar-Pamlico communities are estimated at $30.1 and $10.3 million respectively. Possible cost ranges are also provided to characterize theoretical extremes driven by choice of stormwater control measures. Costs are driven largely by requirements to treat stormwater onsite above state minimum development intensity thresholds.

None of the proposed changes to the Neuse wastewater rule would result in directly increasing costs and potentially result in cost savings for new or expanding facilities. Moreover, proposed changes to the nutrient offset rule allowing permanent offset credits also potentially benefits new and expanding wastewater facilities. Proposed rule amendments to the Tar-Pamlico wastewater rule would result in increased nutrient offset costs for new and expanding facilities due to provisions that ensure they are adequately offsetting increased nutrient loads.

In the analysis of the proposed Neuse and Tar-Pamlico wastewater rules it is difficult if not impossible to reliably predict when, where, and to what degree new and expanding wastewater facilities will require allocation or offset credits at the basin scale. To better illustrate the effects of changes to these rules various realistic permitting scenarios were analyzed at the facility scale. These scenarios are presented in the individual rule chapters and estimate the incremental costs or cost savings for a new or expanding discharger to acquire allocation or offset credits under the proposed wastewater and offset rules.

TABLE 2-1 COSTS & COST SAVINGS TO AFFECTED PARTIES – IN NET PRESENT VALUE DOLLARS OVER 10 YEARS

Rule	Private (Over 10 Years)	Local Government (Over 10 Years)	Local Government One-time Opportunity Cost	State Government (10 Years)	State Government One-time Opportunity Cost
New Development Neuse	$30.1M *(Most Likely)* ($14.3M) - $119.2 *(Low-High Range)*	$2.3M *(Most Likely)* ($1.2M) - $9.6M *(Low-High Range)*	$253k	$97K	$34K
New Development Tar-Pamlico	$10.3M *(Most Likely)* $7.8M - $27.2M *(Low-High Range)*	$446K *(Most Likely)* $378K - $1.3M *(Low-High Range)*	$85k	$55K	$29K
Neuse Wastewater	NQ[1,2]	$0[1,3]	$0	$0*	$0
Tar-Pamlico Wastewater	NQ[1,4]	$0[1,5]	$0	$0*	$0
Nutrient Offset	NQ[6]	NQ[6]	$0	NQ[7]	$0
Neuse Goals	$0	$0	$0	$46K	$0
Tar-Pamlico Goals	$0	$0	$0	$46K	$0
Total	**$40.4** *(Most Likely)* **($6.5M)- $146.4** *(Low-High Range)*	$2.7 *(Most Likely)* **($822K) -$10.9M** *(Low-High Range)*	**$338k**	**$244K**	**$63K**

Notes:

Annual costs show over 10 years in Net Present Value (NPV) dollars

NQ = potential costs or savings present but not quantified at basinwide scale

[1]Cost estimates are scenario-based rather than basinwide and extend beyond 10 years.

[2]Potential savings may be realized by industrial dischargers within 10 years, but the timing and location of these events is uncertain.

[3]Potential savings may be realized for domestic wastewater facilities after 10 years.

[4]Potential costs may be incurred by new or expanding industrial dischargers, but the timing and location of these events is uncertain.

[5]Potential costs may be incurred for domestic wastewater facilities after 10 years..

[6]Unquantified offset costs potentially associated with stream/nutrient stacking option, rule benefits are also unquantified apart from their inclusion in the wastewater rule analyses.

[7]Unquantified costs associated with potential intervention regarding the proposed point to nonpoint source trading ratio of 1.1 to 1.

CHAPTER 3 EVALUATION OF ENVIRONMENTAL BENEFITS AND COSTS

3.1 RULE CHANGE BENEFITS

3.1.1 WASTEWATER RULES

Amendments to the Neuse wastewater rule are not projected to result in any new environmental benefits. Potential cost savings and environmental effects of proposed rule changes are discussed in Chapter 4.

Amendments to the Tar-Pamlico wastewater rule are projected to result in significant new environmental protections in relation to the current rule. The benefit is avoided nutrient loads resulting from new or expanding facilities rather than a projected nutrient reduction. Under the current rule, the nutrient payments required from facilities to secure a permit would only cover 18% (or less) of nutrient reduction needs. Under the new rule, 100% of loads will be offset except for when a facility less than 0.5 MGD expands. However, these benefits will be realized only when new facilities locate in the watershed or existing facilities have a need to expand, a relatively rare occurrence. For the three Tar-Pamlico basin scenarios provided in Chapter 4, the relative nutrient benefit to these rule changes is the difference in the annual credit shortfall calculated between the existing rule and the proposed rule.

3.1.2 NUTRIENT OFFSET RULE

The nutrient offset rule is designed to offset nutrient load increases where allowable by rule. By design, its effects on nutrient loading are neutral, and proposed changes to the rule are not projected to result in any environmental benefit. The reduction of the point to nonpoint source trading ratio from 2:1 to 1.1 may result in environmental costs. Future point to nonpoint source transactions will result in nutrient increases relative to the existing (baseline) rule condition and a relative decrease in confidence that nutrient offset credits derived from nonpoint source practices will adequately neutralize increased loading from more certain point source increases. While this ratio is intended to address uncertainty, the reduction in offset credits required for each wastewater scenario in the Neuse River basin can be found in Chapter 4. This issue is addressed further in Chapter 5.

3.1.3 STORMWATER RULES

The New Development Stormwater Rules require local governments to develop and implement stormwater permitting programs that require developers to implement stormwater controls to meet nutrient loading rate targets on new development projects. Proposed changes to the rules include adding additional communities subject to the rule, requiring one stormwater control measure for development projects over 24% built-upon area before developers can go offsite to buy nutrient offsets and use of the new stormwater accounting tool.

The proposed stormwater rule revisions will provide direct nutrient loading benefits and, arguably more important, substantial hydrologic improvements that in turn will yield secondary nutrient loading benefits. Both nutrient and hydrologic benefits are detailed in the stormwater chapter and summarized in appendix Table A-10. Primary nutrient loading improvements will occur on development in proposed new communities. New Neuse communities, which currently require treatment under Phase II and other regulations, will increase reductions to meet the nitrogen target, while development in new Tar communities, which currently faces no stormwater control requirements, will be required to treat and potentially further offset its loading to fully meet nitrogen and phosphorus targets.

Development in both current and proposed communities will contribute to the *runoff*, or *hydrologic*, benefits quantified in Table 1-2 (and detailed in Table A-10). In current communities, closing an unintended regulatory gap will increase the use of onsite treatment, resulting in 670 new treated ac/yr in Neuse and 250 new treated ac/yr in Tar current communities, providing important runoff elimination as well as detention and slowed release of remaining runoff. Treatment required in proposed new communities will provide both nutrient and runoff elimination benefits.

Stormwater treatment yields runoff elimination through both infiltration/evapotranspiration and slowed release of remaining runoff after detention. These actions protect receiving streams in developed areas from the destabilizing effects of flashy stormflow. Unstable streams become sources of sediment and nutrients to downstream impoundments and estuaries, so protection of streams through stormwater treatment provides this secondary nutrient and sediment benefit. Stream protection also benefits property values, retaining these natural amenities that can otherwise become eyesores, safety hazards and literally result in loss of land.

The nitrogen benefits outlined above could vary based on two factors with real but countervailing effects on nitrogen loading. The first factor is the change in accounting tools, which will decrease load reduction needs, while the second is the shift in emphasis from offset reductions to primarily onsite treatment reductions, where the default offset practice of riparian buffer restoration is likely not presently achieving credited reductions. Analysis of these two factors provided in the stormwater chapter finds that they essentially offset each other, with somewhat greater load reductions under the proposed rule than those estimated in the stormwater chapter, while net phosphorus benefits estimated above will not be meaningfully altered by these factors. The factors are described briefly as follows.

First, regarding the change in accounting tools, runoff nitrogen load estimates produced by the proposed SNAP accounting tool, in capturing refinements in stormwater science, are generally lower than those estimated by the current Tar-Pamlico tool. In most scenarios, SNAP estimates lower untreated nitrogen loading rate values for developed lands, and greater SCM treatment reductions than the Tar tool across SCMs of interest. Phosphorus differences are mixed and overall, negligible. Untreated nitrogen loading difference, negligible at lower development intensities, increases to as much as 4 lb/ac lower in SNAP at 90% BUA. SNAP estimates greater nitrogen treatment for most SCMs, also increasing with intensity. The net effect is a reduced need for nitrogen offsets under the proposed rule relative to current requirements, particularly at high development intensity. This effect is limited to Current Neuse and Tar programs since new programs now have no nutrient requirements.

This loss in real nitrogen load reductions will be countered by the second factor, the shift from offset reductions to primarily onsite treatment reductions. Improvements in riparian buffer restoration science have increasingly revealed that the credit awarded for this current default offset practice exceeds real reductions by a factor of perhaps 3 to 5. While the agency intends to address this disparity as resources permit, it has created a deficit of reductions under the current rule that will be substantially minimized in the proposed condition via the shift to greater use of onsite treatment to meet targets. As detailed in the stormwater chapter, reductions obtained via onsite treatment will match and perhaps modestly outweigh the loss of reductions currently occurring through offset payments.

The benefits analysis summarized in Table A-10 identifies both nutrient loading net benefits and hydrologic benefits, the latter involving both elimination of runoff via infiltration/evapotranspiration and detaining and slowing runoff rates. The most likely SCM scenario, which is continuation of the same mix of SCMs currently in use based on DEMLR evaluation, provides runoff benefits on all programs' newly treated acres and nutrient benefits on

proposed program acres. Both a high-cost, bioretention-only scenario and a low-cost, wetland-infiltration pair scenario would provide even greater hydrologic benefits than the most likely SCM scenario. To the extent that bioretention use increases, bioretention is unique among primary SCMs in producing little overflow and infiltrating the largest fraction of runoff among discharging SCMs. In addition, its treated effluent is believed by some to be slower than most SCMs such that it mimics undeveloped land interflow rates and volumes. The infiltration/wetland pair surpasses even bioretention in hydrologic benefit by virtue of its namesake function of infiltrating the entire water quality volume, eliminating treated effluent. Analysis suggests that some shift to greater infiltration use may occur over time, while expanded use of bioretention may be slower lacking an increase in offset prices as the alternative compliance route.

3.1.4 NONMARKET VALUE OF A CHANGE IN WATER QUALITY

Water quality impairment due to excess nitrogen and phosphorus negatively affects the environmental services provided by North Carolina's surface waters and the associated uses of the resource. The economic value of the changes in nutrient impairment reflects the ecosystem and human use benefits that are dependent upon water quality.

Residents value surface water for fishing and other outdoor recreation, its aesthetic properties, and its ability to support diverse aquatic life of ecological and commercial value. These benefits are discussed in greater detail in section 3.2. Water users receive a "surplus" value from these beneficial uses and water quality attributes above what they spend to use or experience them. Both water users and nonusers value the existence of these resources and their functions, now and for future generations.

It is difficult to monetize water quality changes from nutrient reduction because many of the associated benefits are not priced and traded in markets. Conceptually, the nonmarket economic value associated with a change in water quality is the maximum amount that North Carolina households would be willing to pay to improve the resource (or, conversely, the amount they would be willing to accept as compensation for the loss of a decline in the resource). Although the value of these goods and services are not observable through market transactions, there is some amount households are often willing to pay for them if necessary.

Natural resource economists have developed various methods for estimating households' willingness to pay (WTP) for nonmarket goods, including specially designed stated preference surveys. There are several studies that apply these methods to estimate the economic value of a change in surface water quality.[3]

[3] Illustrative examples include:
J. Huber, W.K. Viscusi, and J. Bell. Economics of Environmental Improvement. September 1, 2006. Report submitted to US EPA under CR823604 and 827423.
R.J. Johnston, E.Y. Besedin, et al. Systematic Variation in Willingness to Pay for Aquatic Resource Improvements and Implications for Benefit Transfer: A Meta-Analysis. 2005. Accessed August 2018 at https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1744-7976.2005.04018.x
N.M. Nelson, J.B. Loomis, et al. Linking Ecological Data and Economics to Estimate the Total Economic Value of Improving Water Quality by Reducing Nutrients. July 21, 2015. Accessed August 2018 at https://www.sciencedirect.com/science/article/pii/S092180091500244X

To apply and adapt this research to estimate the nonmarket value of these proposed rules, it is first critical to know how much these specific regulatory changes will improve nutrient loads and other water quality indicators, and how those changes in turn translate to a change in a water quality status ranking. Estimating the effect size of a specific regulatory change often requires significant data and resources beyond the scope of a fiscal note. Unfortunately, due to a lack of applicable, context-specific research and data limitations, DWR is unable to estimate the effect size of these proposed rules needed to value nonmarket impacts directly.

Phaneuf, von Haefen, Kenney, and colleagues addressed this modeling gap between a change in pollutants and a change in overall water quality status for inland surface water regulations. They then valued the benefits of nutrient reductions for lake recreation in North Carolina. They used expert elicitation to build a water quality model to link measured nutrient pollution changes to a qualitative ranking of surface water quality status in lakes (the effect size). [4] A survey of residents' WTP for better recreation opportunities was used to value the recreational benefits of nutrient management rules (note that other types of nonmarket benefits were not captured).[5] However, since the predictive models were based on hydrologic conditions in freshwater lakes, they cannot be applied to value the nonmarket benefits of these rules, which primarily target estuaries. Due to the differences in hydrological responses to nutrients between lakes and estuaries, applying these models would produce biased estimates of water quality outcomes and associated economic impacts.[6]

In the absence of an effect size estimate, a break-even analysis can be performed by asking "how much of an improvement in water quality would be necessary to offset the cost of this intervention, and are we likely to achieve that degree of change?" The break-even analysis approach requires an estimate of the total costs of the rules. DWR assessed the full costs of certain rule provisions and provided the cost of a range of possible scenarios for the wastewater rule provisions, but the nature of these rules does not allow for a break-even analysis.

Because information and resource limitations preclude the monetary valuation of water quality related benefits associated with this rule, the remainder of this chapter describes expected environmental benefits and costs for the proposed rule changes and for the nutrient strategies as a whole. These benefits are quantified where possible, even if not in financial terms.

3.2 GENERAL ENVIRONMENTAL BENEFITS OF NUTRIENT MANAGEMENT IN THE NEUSE AND TAR-PAMLICO ESTUARIES

3.2.1 CHARACTERIZING GENERAL BENEFITS OF NUTRIENT MANAGEMENT

[4] D.J. Phaneuf, M.A. Kenney, and K.H. Rckhow. Measuring Nutrient Reduction Benefits for Policy Analysis Using Linked Non-Market Valuation and Environmental Assessment Models – An Interim Report on Water Quality Modeling. May 8, 2009. Accessed September 26, 2018 at https://www.epa.gov/sites/production/files/2015-10/documents/grants-waterreport.pdf.

[5] D.J. Paneuf, R.H. von Haefen, C. Mansfield, and G. Van Houtven. Measuring Nutrient Reduction Benefits for Policy Analysis Using Linked Non-Market Valuation and Environmental Assessment Models, Final Report on Stated Preference Surveys. February 2013. Accessed September 26, 2018 at https://www.epa.gov/sites/production/files/2015-10/documents/grants-surveyreport.pdf.

[6] Phaneuf et al. (2009) at 31 ("In all cases we have little confidence in the models' ability to predict outcomes for natural lakes and coastal areas.")

Excessive nutrient inputs can have many negative influences on the estuarine ecosystem and the communities that benefit from them. Conversely, these ecosystems and communities realize benefits from the management of nutrient inputs. This section provides an overview of the types of environmental and social benefits resulting from nutrient management in and around the Neuse and Tar-Pamlico estuaries. The value of the environmental benefits attributable to these proposed rule amendments was not monetized because the magnitude of the associated estuarine response would be difficult to quantify. However, this information is included to provide context and scale for the tangible benefits that result from addressing nutrient impairments in the Neuse and Tar-Pamlico estuaries.

3.2.2 RECREATIONAL BENEFITS

The Neuse and Pamlico estuaries are a fundamental economic asset for surrounding communities. Picturesque estuarine waterfronts and coastal living amenities serve as a focal point for tourism and business development efforts. These waters also serve as a defining community feature, anchoring historic waterfront areas of New Bern and Washington, military training grounds at MCAS Cherry Point, Oriental's sailing culture, and Bath's pirate lore.

For boaters, private marinas and slips encircle the Neuse and Pamlico river estuaries, and the Wildlife Resources Commission maintains 18 public boat ramps providing immediate access. 300,000 vessels are currently registered in in North Carolina.[7] Further, more than 200 miles of paddle trails have been designated in each basin, including the Neuse River Trail segment of North Carolina's Mountains-to-Sea Trail.

Many local swim beaches can also be found along the banks of the Neuse and Pamlico River estuaries and their coastal tributaries.[8] Improved water quality conditions are expected to correlate with an improved recreational experience, increased swimming activity, and decreases in (relatively rare) incidences of human health problems associated with algal blooms. Better stormwater treatment may also materially reduce bacterial runoff in some places, another potential human health hazard.

Finally, riparian areas that are preserved to protect water quality often serve double duty as greenways, providing community amenities for walking, hiking, running, and wildlife viewing.

Geographically targeted figures regarding the influence of coastal estuarine recreation are not presently available, but other lines of evidence can demonstrate their likely magnitude. Economists often utilize visitation information to state and national parks within an area to serve as an indicator of recreational benefits. While such estimates do not include visitation to local parks, private access areas, or downtown waterfronts, they still provide a line of evidence to demonstrate the magnitude of economic impacts.

The economic impacts of visitation to Goose Creek State Park, located east of Washington on the Pamlico River estuary, was estimated to be $17.3 million per year in 2013-14, receiving approximately 250,000 visits annually.[9]

---

[7] N.C. Wildlife Resources Commission website. Accessed September 21, 2018 at https://www.ncwildlife.org/Boating/Where-to-Boat.

[8] https://www.theswimguide.org/

[9] G Von Houtven, C Van Winkle, M O'Neil, K Matthews, and P Sinha. Economic Valuation of the Albemarle-Pamlico Watershed's Natural Resources. April 2016. Last accessed Sept. 12, 2018 at http://apnep.org/c/document_library/get_file?uuid=fcfa52c7-da32-4645-a7a0-8c54c909698b&groupId=61563.

Other state parks that highlight aquatic resources within the Neuse and Tar-Pamlico basins include Cliffs of the Neuse State Park ($12.3 million annual impact, 200,000 annual visitors), Medoc Mountain State Park ($6.9 million annual impact, 100,000 annual visitors. Falls Lake State Recreation Area ($70.8 million annual impact, 1 million annual visitors), Eno River State Park ($34.4 million annual impact, 500,000 annual visitors) and William B. Umstead State Park ($81.5 million annual impact, 1.2 million annual visitors).[10]

Outdoor recreation benefits of the Chesapeake Bay TMDL have also been the subject of recent study. While the Chesapeake Bay boasts larger estuarine area, watershed area, and population than the Neuse and Pamlico River estuaries, recreation benefits of the TMDL (exclusive of fishing) were estimated between $105 and $280 million annually.[11]

3.2.3 PROPERTY VALUE BENEFITS

Residential property values can be significantly enhanced by proximity and access to coastal waters. A 2016 study estimating the economic value of the Albemarle-Pamlico watershed's resources provides estimates associated with proximity to coastal waters.[12] Drawing from that work, the number of near-shore housing units was estimated to be 13,621 within the four counties surrounding the Neuse and Pamlico River estuaries (Beaufort, Craven, Hyde, and Pamlico).[13] The estimated range of value enhancement associated with a proximity of one mile to coastal waters in these counties was between $18.6 and $20.6 million annually.[14]

Property values can be further enhanced when as nearby water quality conditions improve. A recently published review of 48 studies evaluating relationships between water quality and real estate prices indicate that "as a whole, they provide convincing evidence that clean water has a positive effect on property values.[15] Unfortunately, this review did not indicate any studies that could provide direct insights regarding this rule package. Of the 48 studies evaluated ranging from 1968 to present, 10 evaluated property values near bays or

---

Pg. 5-4.

[10] *Id.*

[11] D. Massey, C. Moore, S. Newbold, T. Ihde and H. Townsend, 2017. "Commercial fishing and outdoor recreation benefits of water quality improvements in the Chesapeake Bay," NCEE Working Paper Series 201702, National Center for Environmental Economics, U.S. Environmental Protection Agency, revised Jul 2017. Accessed September 21, 2018 at https://www.epa.gov/environmental-economics/working-paper-commercial-fishing-and-outdoor-recreation-benefits-water.

[12] G Von Houtven, C Van Winkle, M O'Neil, K Matthews, and P Sinha. Economic Valuation of the Albemarle-Pamlico Watershed's Natural Resources. April 2016. Last accessed Sept. 12, 2018 at http://apnep.org/c/document_library/get_file?uuid=fcfa52c7-da32-4645-a7a0-8c54c909698b&groupId=61563.

[13] Carteret County, while bordering the Neuse River Estuary, was omitted from this analysis. It has a substantial amount of beachfront property along Bogue Banks and most other nearshore residential development occurs along Bogue, Back, and Core Sounds.

[14] *Id*. at 5-4 to 5-6, see table 5-3.

[15] S Nicholls and J Crompton. A Comprehensive Review of the Evidence of the Impact of Surface Water Quality on Property Values. Sustainability. 13 February 2018.

harbors. Of these, significant geographic differences or different water quality indicators preclude direct transfer in this context.

One notable study in Narragansett Bay (RI) associates a one 1ug/mL increase in chlorophyll *a* (current standard is 40 ug/mL in NC) with a price decline of 0.06 to 0.1%. Another forthcoming study available to Nicholls and Crompton showed that a 10% improvement in light attenuation (water clarity) was associated with a 0.6% property value increase for waterfront properties on the Chesapeake Bay. Lesser benefits also accrued for other properties within 500 meters of the Bay. Total property value increases were projected between $400-$700 million. Improved water clarity is an expected benefit of North Carolina's nutrient reduction strategies, as algae can reduce clarity in combination with dissolved organic matter and sediment.

The benefits of providing onsite stormwater quality control include the capture, detention and treatment of stormwater yields that not only result in significant reduction of pollutants, but also result in the reduction of both total volume and rates of runoff exiting developments. This runoff reduction helps mitigate the large increases in volume and velocity that can accompany development due to sloping and compacting of soil, addition of buildings, parking, streets and other impervious surfaces. These reductions in both volume of stormwater and the velocity of the water that flows into streams and rivers serves as an important source of flood mitigation and protect the natural function of floodplains and in turn helps reduce damage to infrastructure and property. These actions also protect streams from the destabilizing effects of flashy stormflow. Unstable streams become sources of sediment and nutrients to downstream impoundments and estuaries. Stream protection also benefits property values, retaining these natural amenities that can otherwise become eyesores, safety hazards and may result in loss of land.

Local property value benefits also provide an increased tax base to support local government programs. The review by Nicholls and Crompton notes that none of the 48 studies reviewed estimated local tax revenue increases associated with water quality improvements.

3.2.4 RECREATIONAL FISHING BENEFITS

Saltwater recreational fishing has substantial economic impacts in North Carolina. While a geographically refined estimate of recreational fishing economic activity in the Neuse and Pamlico River estuaries is not presently available, other recreational estimates available from the Division of Marine Fisheries demonstrate the general economic magnitude of such activities.

Statewide estimates of coastal recreational fishing impacts are available from the Division of Marine Fisheries. While the Pamlico Sound area is large and comprises a substantial fraction of statewide recreational activity, these figures also include other commonly fished inland waters (e.g., Albemarle Sound) as well as fishing activity from oceanfront shorelines and in deep water. Nevertheless, with more than 1.5 million participants and output impacts exceeding $1.5 billion annually, this sector is a major contributor to the coastal economy.

TABLE 3-1 ECONOMIC IMPACTS OF COASTAL RECREATIONAL FISHING IN NORTH CAROLINA[16]

Year	Recreational Participants[1]	Estimated Expenditures[2]	Jobs[3,4]	Income Impacts[4]	Output Impacts[4]
2016	1,888,821	$1,747,730,000	15,069	$621,019,000	$1,575,947,000
2015	1,547,964	$1,754,483,000	16,624	$664,672,000	$1,658,302,000
2014	1,655,544	$1,525,307,000	16,050	$592,779,000	$1,732,482,000

[1]Participant estimates as reported by the NMFS MRIP.

[2]Estimated expenditures includes both durable good expenditures and fishing trip expenditures.

[3]Includes full time and part time jobs.

[4]Economic impacts calculated using the NCDMF coastal recreational fishing economic impact model and IMPLAN economic impact modeling software. Economic impact estimates are for the state economy of North Carolina.

The Central Southern Management Area includes the Neuse, Tar-Pamlico, and Cape Fear River Basins. Creel surveys have been deployed throughout these basins for anglers targeting anadromous species including striped bass, American shad, and Hickory shad. Economic impact figures of that recreational fishery are provided below.

TABLE 3-2 ECONOMIC IMPACTS OF RECREATIONAL FISHING IN COASTAL RIVER SYSTEMS OF THE CENTRAL SOUTHERN MANAGEMENT AREA IN NORTH CAROLINA, 2016[17]

River System	Estimated Angler Hours	Estimated Fishing Trip Expenditures	Jobs[1,2]	Income Impacts[2]	Output Impacts[2]
Neuse River	210,111	$1,176,000	17	$639,000	$1,954,000
Tar-Pamlico Rivers	245,998	$1,938,000	27	$1,033,000	$3,204,000
Neuse & Tar-Pamlico	456,109	$3,114,000	44	$1,672,000	$5,158,000

[1]Includes full time and part time jobs

[2]Economic impacts calculated using the NCDMF CSMA recreational fishing economic impact model and IMPLAN economic impact modeling software. Economic impact estimates are for the state economy of North Carolina.

3.2.5 COMMERCIAL FISHING BENEFITS

Many of North Carolina's most important commercial fishery species are dependent on estuaries for part or all of their life cycle. The ecological relationships between these species and various habitat types are described in forthcoming sections. The N.C. Division of Marine Fisheries has also characterized economic benefits associated with commercial fisheries in these areas.

[16] Adapted from 2017 Annual Report, N.C. Division of Marine Fisheries, Table VI.15 pgs. VI.23, accessed at http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=31127300&name=DLFE-135240.pdf on Sept. 20, 2018.

[17] Adapted from 2017 Annual Report, N.C. Division of Marine Fisheries, Table VI.16 pgs. VI-23, accessed at http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=31127300&name=DLFE-135240.pdf on Sept. 13, 2018.

A general estimate of economic impacts of commercial fisheries in this area is provided by a 2014 Division of Marine Fisheries report authored by Hadley and Weigand.[18] The "Pamlico Sound" area was defined to includes Pamlico Sound but also the Pungo, Pamlico, Bay, and Neuse rivers, which generally coincide with estuarine areas influenced by the Neuse and Tar-Pamlico nutrient strategies. The authors note that these estimates are conservatively low because they represent only the harvesting sector of the commercial fisheries industry due to a lack of data regarding seafood distribution, wholesale, retail markets, and restaurant sales. [19]

TABLE 3-3 ECONOMIC IMPACTS OF COMMERCIAL FISHING IN THE PAMLICO SOUND (2012) [20]

Pounds[1]	Ex-Vessel Value[1]	Jobs[2,3]	Income Impacts[3]	Output Impacts[3]
13,982,734	$19,091,423	909	$13,350,200	$30,306,900

[1] As reported by the North Carolina Division of Marine Fisheries (NCDMF) trip ticket program

[2] Represents the total number of full time and part-time jobs combined.

[3] Economic impacts calculated using the NCDMF commercial fishing economic impact model and IMPLAN economic modeling software. All economic estimates are for the state economy of North Carolina.

Alternate and more geographically targeted estimates are also available. Five coastal counties border the Neuse and Pamlico River estuaries: Carteret, Craven, Pamlico, Beaufort and Hyde. This list significantly overlaps with the list of five counties providing 80% of the states total landings by weight and value from 1994 to 2012, which adds Dare but subtracts Craven.[21] However, the geographical overlap is between county boundaries and watershed areas imperfect. For example, Carteret County fishermen are included but many fish may be caught outside of the Neuse River estuary in Bogue or Core Sound, while Dare County fishermen are omitted but likely have significant landings from Pamlico Sound.

TABLE 3-4 AVERAGE VALUE, LANDINGS, AND TRIPS FOR COMMERCIAL FISHERIES IN SELECT COUNTIES NEAR THE NEUSE AND PAMLICO RIVER ESTUARIES BETWEEN 1994 AND 2012[22]

County	Average Value	Average Landings (lbs.)	Average Trips
Beaufort	$5,513,124	6,901,200	18,975
Carteret	$16,815,573	48,361,299	32,231
Craven	$605,236	709,920	2,799
Hyde	$9,619,717	10,474,819	15,494
Pamlico	$8,176,339	6,878,043	13,571

[18] J. Hadley and C. Wiegand. An Economic and Social Analysis of Commercial Fisheries in North Carolina: Albemarle Sound and Pamlico Sound. N.C. Division of Marine Fisheries. March 2014. Accessed September 19, 2018 at http://digital.ncdcr.gov/cdm/compoundobject/collection/p16062coll9/id/166143/rec/1.

[19] *Id.* at 13.

[20] *Id*. at 32.

[21] S. McInerny and J. Hadley. An Economic Profile Analysis of Coastal Commercial Fishing Counties in North Carolina. N.C. Division of Marine Fisheries. March 2014 (see page 13). Accessed September 19, 2018 at http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=31440106&name=DLFE-138438.pdf.

[22] *Id.* at 16.

The Division of Marine Fisheries' 2017 Annual report provides more recent and more geographically precise estimates within this five county area.

TABLE 3-5 COMMERCIAL SEAFOOD LANDINGS (POUNDS AND VALUE) BY DEALER CITY IN 2016 (* INDICATES CONFIDENTIAL DATA)** [23]

County	Dealer City	Pounds	Value
Beaufort	Aurora/Blounts Creek	953,889	$838,636
	Bath	1,021,248	$856,214
	Beaufort Other	1,087	$2,593
	Belhaven	866,352	$886,314
	Washington	558,413	$633,138
Carteret	Bogue Banks	98,208	$178,669
	Carteret Other	303,919	$677,355
	Downeast Communities	1,283,620	$2,446,829
	Morehead City/Beaufort	6,066,260	$14,440,717
	Western Carteret	226,679	$426,308
Craven	Craven Other	2,849	$4,939
	Havelock	4,965	$8,115
	New Bern/Bridgeton	383,683	$505,559
Hyde	Engelhard	4,124,573	$7,505,492
	Hyde Other	449	$1,704
	Ocracoke	436,738	$748,453
	Swan Quarter	3,294,376	$4,603,033
Pamlico	Arapahoe	62,203	$101,772
	Bayboro/Alliance/Grantsboro/Stonewall	333,585	$625,017
	Hobucken/Lowland	1,566,816	$4,691,929
	Merritt	386,148	$425,353
	Oriental	2,040,637	$4,664,431
	Pamlico Other	6,198	$21,905
	Vandemere	***	***

[23] Adapted from 2017 Annual Report, N.C. Division of Marine Fisheries, Table II.9 pgs. II-73, accessed at http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=31127300&name=DLFE-135240.pdf on Sept. 13, 2018.

3.2.6 AQUATIC LIFE BENEFITS

The biota living within rivers, streams, and estuaries of the Neuse and Tar-Pamlico basins are expected to see multiple benefits from the Neuse and Tar-Pamlico rules generally. Nutrients are required to sustain aquatic life, but excess nutrients can have harmful effects that manifest themselves through multiple ecological pathways.

North Carolina's nutrient strategy rules are designed to reduce the frequency, severity, and duration of harmful and other algal blooms, thus improving the aquatic environment with healthier oxygen and pH levels, reducing detrimental or toxic chemical byproducts of algae, improving visibility, and generally creating a healthier environment for fish and the rest of the aquatic food web.

Nutrient inputs affect aquatic life directly in many respects, but additional effects result from nutrients' influence on keystone habitat species. The effects of excess nutrients on the water column, submerged aquatic vegetation, and shell bottom are discussed below. These three habitat types also influence each other through various positive feedback mechanisms. To the extent the Neuse and Tar-Pamlico strategies prevent or mitigate excess nutrient loading, they also have a positive influence on estuarine habitats and associated aquatic life.The 2016 Coastal Habitat Protection Plan Source Document ("source document") provides a current and comprehensive agency literature review of relationships between water quality, various aquatic habitats and aquatic life.[24] However, due to its technical rigor and length (475 pages), it can be difficult to independently synthesize key findings with respect to the Neuse and Tar-Pamlico rules. Therefore, the remainder of this section (2.2.4) provides a summary of key information contained in that document. References provided are directly to the source document. For interested readers, the source document itself contains detailed primary literature citations.

The source document supports actions in the 2016 Coastal Habitat Protection Plan, which contains goals and recommendations jointly approved by the Environmental Management Commission, the Coastal Resources Commission, and the Marine Fisheries Commission.[25] North Carolina's nutrient strategies are generally referenced by goal 4, recommendation 6 which states: "Maintain effective regulatory strategies throughout the river basins to reduce nonpoint pollution and minimize cumulative losses of fish habitat, including use of vegetated buffers and established stormwater controls."

3.2.6.1 BENEFITS TO AQUATIC LIFE FROM WATER COLUMN ENHANCEMENT

The influence of nutrients on the water column is well documented and is the primary driver for the Neuse and Tar-Pamlico rules. Excess nutrients fuel eutrophication and excess algae growth. Excess algae growth can cause a precipitous rise in pH and potential localized effects to resident aquatic life, including egg development, reproduction, or the ability to absorb dissolved oxygen.[26] The decomposition of algae by microbes can increase

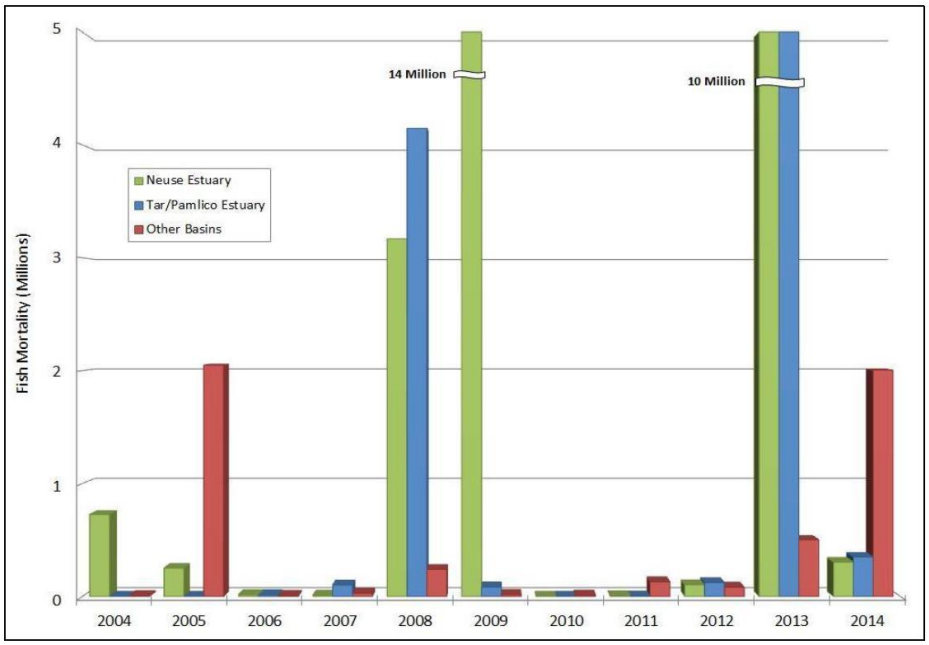
[24] NCDEQ (North Carolina Department of Environmental Quality) 2016. North Carolina Coastal Habitat Protection Plan Source Document. Morehead City, NC. Division of Marine Fisheries. 475 p. Accessed September 20, 2018 at http://portal.ncdenr.org/c/document_library/get_file?uuid=5d02ccd2-3b9d-4979-88f2-ab2f9904ba61&groupId=38337.

[25] NCDEQ (North Carolina Department of Environmental Quality) 2016. North Carolina Coastal Habitat Protection Plan. Accessed September 20, 2018 at http://portal.ncdenr.org/c/document_library/get_file?uuid=68734102-5af8-462a-8562-734562dc965f&groupId=38337.

[26] North Carolina Coastal Habitat Protection Plan Source Document at 22-23.

biochemical oxygen demand (BOD) and cause hypoxic or anoxic conditions in the water column. Low dissolved oxygen levels can cause fish kills, displace aquatic life, and inhibit growth or metabolism of aquatic species.[27] Such effects can be highly visible, or they may result in more subtle impacts like mortality of planktonic larvae.[28] Finally, some algae are capable of producing toxins, which can affect aquatic life mortality or morbidity. As nutrient levels are reduced, the occurrence of these negative environmental effects are reduced in duration, severity, and frequency.

FIGURE 3-1 ANNUAL FISH MORTALITY FROM FISH KILL EVENTS, 2004-2014[29]



The source document summarizes the influence of the water column on aquatic species:

> "The water column connects all fish habitats, emphasizing the need for ecosystem management in aquatic systems. Environmental conditions of the water column, including salinity, temperature, flow, pH, nutrients, and DO, are the primary factors determining the distribution and abundance of coastal fish

[27] *Id.* at 23.

[28] *Id.* at 26.

[29] *Id.* at 45.

species and communities. Seasonal and annual variations in these factors are affected by both climatic cycles and anthropogenic stressors."[30]

3.2.6.2 BENEFITS TO AQUATIC LIFE FROM SUBMERGED AQUATIC VEGETATION ENHANCEMENT

Submerged aquatic vegetation is colloquially known as seagrass, though "sea" grass is a bit of a misnomer because some species grow in brackish and freshwater inland areas as well. Where physical conditions have historically supported SAV growth, loss of these habitats is largely attributable to nutrient enrichment and sedimentation.[31] Nutrients affect submerged aquatic vegetation by limiting the light available for their growth. Excess algal growth in the water column can reduce light pentration to shallow habitats that might otherwise be suitable for SAV growth. Further, epiphytic algal growth on SAV leaves further reduces light available to SAV.[32] SAV presence is generally considered a barometer of water quality due to due to its stringent water quality requirements.[33]

Journal accounts from fishermen from the late 1800s describe extensive beds of SAV along mainland Pamlico Sound where it was absent in the late 1990s.[34] A mosaic of historically known SAV locations since 1983 is maintained by DMF and also indicates that many mainland estuarine areas of the Neuse and Pamlico rivers have supported SAV at some time. While quantitative comparisons are not available, recent surveys have detected their presence only sparsely.[35] Published research findings indicating the presence of SAV declined in the mid-1970s in the Pamlico River estuary and in the mid-1980s in the Neuse River.[36]

SAV is considered "essential fish habitat" by the South Atlantic Marine Fisheries Commission for brown, white, and pink shrimp as well as species in the snapper-grouper complex.[37] Many other species rely on it for refuge, spawning, nursery, foraging, and habitat connectivity.[38] Some fish are commercially or recreationally significant: a partial list of species that utilize SAV in estuarine environments includes river herring, striped bass, yellow perch, American eel, bay scallop, blue crab, grass shrimp, hard clams, red drum, spotted seatrout, Atlantic croaker, Atlantic menhaden, southern flounder, spot, and striped mullet.[39] SAV also provides habitat for wading birds who forage in these environments.[40]

SAV also provides physical benefits to the estuarine environment. This includes accelerated deposition of sediment and organic matter, binding of sediments under the canopy, nutrient cycling, modification of water flow

---

[30] *Id.* at 47.

[31] *Id.* at 227.

[32] *Id.* at 85.

[33] *Id.* at 83.

[34] *Id.* at 97.

[35] *Id.* at 101.

[36] *Id.* at 97.

[37] *Id.* at 91.

[38] *Id.* at 94-96.

[39] *Id.* at 92.

[40] *Id.* at 96.

and reduction in wave turbulence. In turn, these characteristics create another positive feedback loop where shoreline turbulence is buffered, erosion is reduced, clarity is improved, and upland marsh habitat is stabilized. [41]

The economic value of SAV has been quantified in association with various ecosystem services that it provides. One estimate indicates the value of SAV and algal beds combined is $7,700/acre/year for services including seafood production, wastewater treatment, climate regulation, erosion control,recreation, and others.[42] The value of SAV for denitrification services alone (wastewater treatment) is estimated at $3,000/acre/year.[43] In one Chespeake Bay study, nutrient levels within a dense SAV bed were 73% below levels found outside of the bed. [44] Thus, when threshold water quality conditions are sufficient to support SAV habitat, those habitats in turn can further reduce nutrient concentrations in surrounding waters.

Taken together, these findings indicate that reduced nutrient loading and improved water quality can result in increased growth and density of SAV in North Carolina's estuarine waters. Such improvements would enhance aquatic life within these estuarine systems in addition to providing a variety of valuable cobenefits.

3.2.6.3 BENEFITS TO AQUATIC LIFE FROM SHELL BOTTOM ENHANCEMENT

As with SAV, habitat created by shellfish species like oysters and clams is relatively rare in the Neuse and Pamlico river estuaries. However, as these water bodies transition to Pamlico Sound they become more abundant, with oysters commonly found in the lower portion of Pamlico Sound tributaries and along the western shore of Pamlico Sound.[45]

Shellfish habitat could potentially be more abundant with improved water quality conditions. Anecdotal information from researchers suggests sediment has buried oysters in some locations that were once abundant, including the northeast side of the Neuse River.[46] Oysters also require adequate dissolved oxygen for survival. While they can survive for up to five days in hypoxic conditions, such conditions may also cause sublethal stress or mass mortality.[47] The North Carolina Shellfish Lease Siting Tool indicates that physical conditions in the Neuse and Pamlico River estuaries are potentially appropriate for shellfish growth.

---

[41] *Id.* 91.

[42] *Id.* at 90.

[43] *Id.* at 90.

[44] *Id.* at 91.

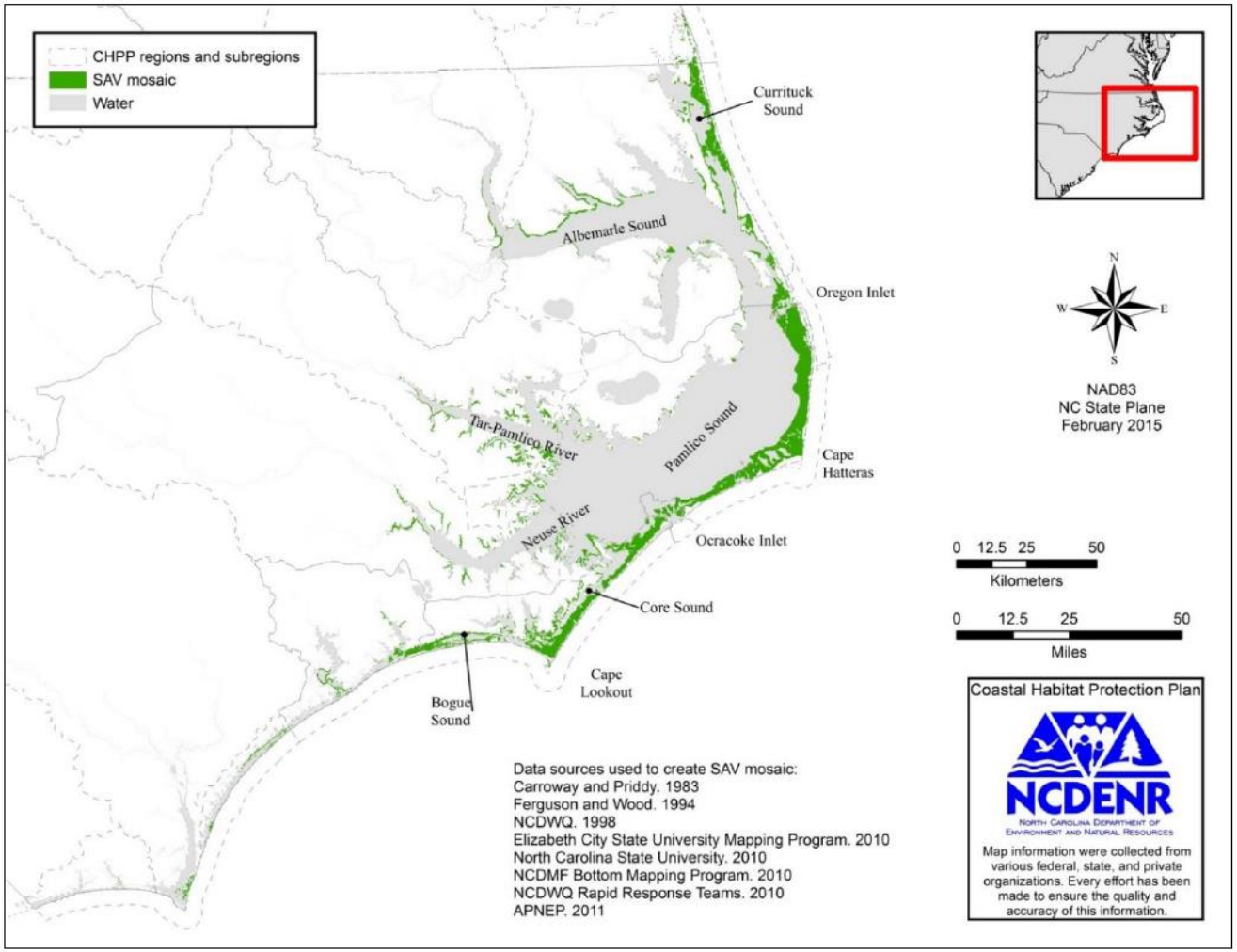
[45] *Id.* at 57.

[46] *Id.* at 63.

[47] *Id.* at 57.

FIGURE 3-2 SUBMERGED AQUATIC VEGETATION MAPPED FROM 1981 TO 2011 (ADAPTED FROM CHPP SOURCE DOCUMENT, PAGE 101)*

* Absence of SAV does not suggest actual absence, as surveys have not been conducted in all areas. Presence of SAV does not reflect current state, as data dates to 1981..



Shell bottom habitats provide many aquatic life benefits if threshold conditions for their survival can be met. In addition to being commerically valuable themselves, oysters and clams provide wave buffering benetifts to help establish other habitats like wetlands and SAV.[48] They provide structure for further shellfish recruitment as well as refuge and nursery areas for many finfish, mollusks, and crustacean species.[49] Statewide, dozens of species have documented relationships with natural and restored oyster reefs, including American eel, Atlantic croaker, Atlantic menhaden, black sea bass, sheepshead, spotted seatrout, red drum, and southern flounder. [50] The most abundant species on oyster reefs are generally small forage fishes and crustaceans that serve as a critical food source for economically important fishes."[51]

Shellfish also have a positive influence on water quality. Educational materials often cite the fact that a single eastern oyster (*Crassostrea virginica*) can filter particulate matter from up to 50 gallons of seawater every day.[52] Studies in North Carolina's tidal creeks and in laboratory experiments show that oysters can successfully and substantially reduce total suspended solids (TSS) and chlorophyll *a* while increasing light penetration through the water column.[53] Further, nitrogen removal rates by shellfish can be substantial, with reef envirnoments potentially processing 30-40 times more nutrients than sediments alone.[54] The benefit of nitrogen removal for oyster reefs was estimated at $2,969 per acre per year (in 2011 dollars).[55]

3.2.7 DRINKING WATER BENEFITS

The Neuse and Tar-Pamlico estuaries do not serve as a drinking water source due to their brackish nature and the availability of other surface and groundwater drinking sources in the region. Surface water intakes occur throughout the Neuse and Tar-Pamlico basins, but nutrient strategy rules are not expected to have significant impact on these sources because dense concentrations of algae requiring additional levels of treatment do not typically occur in fast moving riverine waters. Some treatment benefits associated with these rules may conceivably accrue where surface water intakes draw from smaller reservoirs in the region (e.g., Tar River Reservoir). Major drinking water benefits have been described in prior fiscal notes for the Falls Lake Strategy, an analogous but generally more stringent set of rules which governs the upper portion of the Neuse River Basin. In 2010, avoided drinking water treatment costs attributable to the Falls Lake Strategy were estimated between $43-266 million over thirty years and reduced drinking water treatment costs were estimated at $600,000 to $800,000 annually.[56]

---

[48] *Id.* at 68.

[49] *Id.* at 59.

[50] *Id.* at 59.

[51] *Id.* at 59.

[52]Also see Riisgård, Hans Ulrik. (1988). Efficiency of particle retention and filtration-rate in 6 Species of Northeast American Bivalves. Marine Ecology Progress Series - 45. 217-223 (filtration rate of 6.8 L/hr or 43 gallons per day).

[53] Coastal Habitat Protection Plan Source Document at 59.

[54] *Id.* at 60.

[55] *Id.* at 60.

[56] N.C. Division of Water Quality Planning Section. Fiscal Analysis for Proposed Nutrient Strategy for Falls of the Neuse Reservoir. June 14, 2010. Pg. xix.

CHAPTER 4 WASTEWATER RULES

4.1 INTRODUCTION

Discharges from wastewater treatment plants are subject to the federal Clean Water Act. When water quality impairments in surface waters are identified, states typically calculate a total maximum daily load (TMDL) for the pollutant of concern and allocate pollution reduction levels among sources necessary to meet water quality standards. The TMDL further establishes a wasteload allocation (WLA), which is the maximum amount of a pollutant that may be discharged by NPDES-permitted wastewater sources.

Due to water quality impairments in the Neuse and Tar-Pamlico estuaries, the watersheds draining to them are subject to a TMDL and major point sources located in these watersheds are subject to nutrient limits. In addition to individual limits for larger facilities, a group watershed permit also applies to members of the Neuse River Compliance Association and the Tar-Pamlico Basin Association. These group permits (and associated agreements where applicable) provide significant flexibility for individual permittees to meet their nutrient obligations in a cost-effective manner.

To accommodate growth in impaired watersheds, new and expanding permittees must secure nutrient allocation in a manner consistent with the TMDL and the WLA. Nationally, this is generally done in one of two ways. First, allocation may be secured directly from another facility through a permanent sale or temporary lease. Alternatively, nutrient offset credits may be purchased, which are generated by the installation of nonpoint source practices and credited according to their estimated performance. Offset credits are then used to justify increased nutrient allocation within a new or revised permit.

From this common basis, the Neuse and Tar-Pamlico wastewater rules presently diverge in their approach to facilitating expansions and new facilities. The existing Tar-Pamlico wastewater rule was developed first and establishes a fixed nutrient offset payment rate that has not changed over time. It does not explicitly provide an option for allocation trades. The existing Neuse wastewater rule instead references the nutrient offset rule as the foundation for acquiring credits, which invokes existing market-based rates set by private mitigation bankers or the Division of Mitigation Services. It also explicitly provides an option for allocation acquisition. The proposed rules are substantially similar and more closely approximate the present approach in the Neuse basin. However, due to current differences, the fiscal evaluation of proposed changes differs greatly between basins.

4.2 NEUSE WASTEWATER RULE

4.2.1 NO ACTION ALTERNATIVE: PRESENT RULE

The existing Neuse wastewater rule, 15A NCAC 02B .0234, establishes the basis for setting nitrogen discharge allocation and associated permit limits for wastewater facilities throughout the Neuse River basin. It also establishes conditions required for existing facilities to expand or for new facilities to be permitted. Finally, it establishes an option for wastewater facilities to join a group compliance association to collectively meet their nutrient load allocations.

4.2.2 PROPOSED RULE

The proposed rule contains many clarifying edits but no substantive policy changes regarding existing allocations or group compliance. However, at least three provisions have been changed that potentially result in cost savings to new or expanding facilities. In the proposed rule, new and expanding facilities would not be required to pursue nutrient allocation first, they would be allowed to acquire offset credits in five or 10-year increments rather than 30-year increments, and they would be subject to a reduced point to nonpoint source trading ratio. Moreover, a proposed change to the nutrient offset rule allowing permanent offset credits also potentially benefits new and expanding wastewater facilities.

The first change proposed in the rule removes the existing requirement that new or expanding facilities "shall make every reasonable effort to obtain estuary allocation for the proposed wastewater discharge from existing dischargers." While this language appears to express a preference for obtaining allocation over offset credits, its broad language would be impractical to enforce. While the removal of this requirement might have some small financial benefit to regulated entities, this fiscal analysis shows that securing allocation is typically a more cost-effective approach than purchasing offset credits. Therefore, while the regulatory requirement is removed, potential permittees are likely to vigorously pursue this option anyway. Therefore, the Division ascribes no quantitative benefit to this change.

The next change is the allowance of tiered acquisition of nutrient offset credits. The existing rule requires a potential permittee to acquire 30 years of nutrient offset credits before the facility can be permitted. The proposed rule instead allows the permittee to secure offset credit or allocation for the ensuing ten-year period at the time of each permit renewal (typically 5 years). The existing rule is silent on whether the 30-year stipulation would apply to the acquisition of allocation, but the Division interprets that a rolling ten-year cushion as proposed in the new rule would be acceptable under the current rule. Therefore, while this option would become explicitly permissible for acquisition of either allocation or offset, potential cost savings are only realized for the offset credit acquisition option. This revision is intended to reduce costs associated with the immediate creation of permit cap room that may not be utilized for decades while still ensuring that new nutrient inputs are offset.

The third change is reduction of the point to nonpoint source trading ratio from 2:1 to 1.1:1. Trading guidance from the Environmental Protection Agency requires that nutrient trades account for the relative differences in uncertainty between directly monitored point source discharges and nonpoint sources, for which nutrient loading reductions are typically estimated using literature estimates or empirical or engineering formulas and professional judgement. Earlier rule drafts retaining the current 2:1 ratio drew comment, and in May 2018 the Water Quality Committee reduced the ratio to 1.1:1, or 1:1 with monitoring. To the extent that dischargers rely on the economically efficient alternative of obtaining allocation as described above, this rule change would not affect costs.

The final change is the proposed allowance of permanent nutrient offset credits in addition to temporary offset credits in the nutrient offset rule. Development is effectively permanent on the scales considered for nutrient offset purposes, and the agricultural buffer practice presently generating most offset credits is permanent in nature because it is protected by a permanent conservation easement. However, the current nutrient offset rule only provides credit for 30 years. Permanent credits are likely to provide additional value for local governments implementing existing development rules and for wastewater facilities, who can use them for offset purposes in year 31 and beyond instead of seeking new sources of credit.

4.2.3 ANALYTICAL APPROACH

As described above, the Neuse wastewater rule contains several changed provisions that potentially result in cost savings for new or expanding facilities. None of the proposed changes would result in directly increasing costs. This is a fundamental contrast from the Tar-Pamlico analysis, where proposed rule amendments result in increased nutrient offset costs for new and expanding facilities due to provisions that ensure they are adequately offsetting increased nutrient loads.

It is difficult if not impossible to reliably predict when, where, and to what degree new and expanding facilities will require allocation or offset credits at the basin scale. For domestic wastewater sources, population growth is likely to be a key driver of expansion needs. From 1990-2010, the average annual growth rate in the Neuse River Basin was 2.56% (See Table 4-1). Individual local governments and independent facilities typically engage in long range planning to ensure wastewater needs continue to be met, and DWR is aware of conceptual long-term expansion plans from permittees in the Neuse basin.

TABLE 4-1 POPULATION GROWTH IN THE NEUSE RIVER BASIN. ADAPTED FROM 2012 ALBEMARLE-PAMLICO ECOSYSTEM ASSESSMENT.

Basin or Subbasin	1990 Population	2010 Population	Annual growth rate
All Neuse	1,017,817	1,687,332	2.56%
Neuse 01	671,670	1,251,126	3.16%
Neuse 02	141,692	172,358	0.98%
Neuse 03	116,023	155,242	1.47%
Neuse 04	88,432	106,606	0.94%

Most major existing dischargers in this basin are constituent members of the Neuse River Compliance Association. In 2017 their combined annual flow was 101.5 MGD, equating to 57% of a collectively permitted flow of 177.9 MGD. From 1995 increasing flow trends are apparent, though year-to-year fluctuations are substantial. From a nutrient performance perspective, in 2017 these facilities collectively discharged 41.4% of their permitted TN load, though in recent years that number has been closer to 50%. Additional NRCA performance data is provided in Table 4-2.

TABLE 4-2 NEUSE RIVER COMPLIANCE ASSOCIATION NUTRIENT PERFORMANCE, 2017

Permitted Cap (lbs. TN)	1,187,213
Loading (lbs TN.)	491,822
Cap Room (lbs. TN)	695,391
% NRCA Cap	41.4%
Average Effluent Concentration (mg/L TN)	2.53

The effects of this rule change on potential new industrial sources of wastewater are even harder to forecast. New industrial sources may seek to discharge into existing wastewater facilities or they may seek their own discharge permit. Flow and nutrient effluent limits may also be subject to any number of factors, including the size of the facility, the industry supported, and the technological ability to treat or reuse effluent.

In sum, multidecadal nutrient forecasts of new and expanding dischargers are subject to vast amounts of uncertainty. Instead, to better illustrate the effects of changes to these rules and provide accompanying policy analysis, various realistic permitting scenarios are analyzed at the facility scale. The scenarios presented below estimate the incremental costs or cost savings for a new or expanding discharger to acquire allocation or offset credits under the proposed rules. While the scenarios reflect conservative estimates of the timing of the first expected occurrence of an expansion or addition of a domestic discharger (large and small) and an industrial discharger, this analysis does not attempt to predict the timing and frequency of all such events in the coming decades.

For each permitting scenario, a permittee can choose to meet the requirements of the rule by securing permanent allocation (a "sale" or "purchase"), temporary allocation (a "lease"), and/or nutrient offset credits. The costs for complying with the rule using each option are provided for the existing rule, the proposed rule, and a suite of policy alternatives. Policy alternatives are provided for two reasons. First, these alternatives help demonstrate the fiscal implications of each rule change individually as well as collectively. Second, they demonstrate the relative financial implications of various point to nonpoint source trading ratios in response to ongoing stakeholder and Commission interest in this provision.

As part of this analysis, Division staff notes that the default 1.1:1 trading ratio proposed is well below the national norm of between 2 and 3 to 1 and that a rigorous technical justification for the proposed change is not presently available. This proposed ratio is included in the Neuse wastewater rule and in the nutrient offset rule, where its application would be universal across all nutrient management strategies. The adoption of an equivalent ratio in Pennsylvania resulted in EPA intervention, ultimately precluding a point to nonpoint source trading option for permittees until an interim 3:1 ratio was adopted.[57] A qualitative discussion of costs associated with potential federal intervention into North Carolina's nutrient trading program is provided in Section 5.3.2 as part of the analysis of the nutrient offset rule.

4.2.4 KEY ASSUMPTIONS

4.2.4.1 NITROGEN OFFSET CREDIT COSTS

Nitrogen offset credit costs are published by the Division of Mitigation Services (DMS) and updated quarterly according to their rule-based actual cost method. Nitrogen offset credits are available for purchase from private nutrient offset banks and in fact many potential credit purchasers will be required to exhaust all private credits before utilizing DMS's in-lieu fee program. However, private rates are not published and are therefore unavailable for analysis. Therefore, DMS's rate will be used for the remainder of this analysis.

Table 4-3 shows the varying nitrogen offset costs in the Neuse basin, ranging from $10.52 to $21.86 depending on the geographical area. The Neuse 01 subbasin contains much of the fast-growing Raleigh-Durham-Chapel Hill combined statistical area. High population growth rates in this area make it the most likely candidate for future

[57] See Phase 2 Watershed Implementation Plan Nutrient Trading Supplement, Pennsylvania Department of Environmental Protection, Revised October 14, 2016. Accessed August 3, 2018 at: http://files.dep.state.pa.us/Water/BPNPSM/NutrientTrading/NutrientTradingSupplementToPhase2WIP.pdf. ("To address EPA's concern and ensure consistency with the Chesapeake Bay TMDL, DEP is implementing a 3:1 trading ratio as an interim step until DEP can develop a performance-based or other approved method-based tool to use to establish baseline eligibility for nonpoint sources.")

new or expanding domestic wastewater plants. Therefore, for the scenarios evaluated below, the higher rates in the Neuse 01 subbasin are used by default.

TABLE 4-3: OFFSET CREDIT PRICING BY NC DMS IN THE NEUSE AND TAR-PAMLICO RIVER BASINS

Service Area	Nutrient	Sep. 2010	July 2018	Difference	Net change	Annual Growth Rate
Neuse 01 excl. Falls	Nitrogen	$18.49	$21.86	$3.37	18%	2.11%
Neuse 02, 03, 04	Nitrogen	$12.97	$13.37	$0.40	3%	0.38%
Falls Lake	Nitrogen	$18.49	$10.52	-$7.97	-43%	-6.81%
Tar-Pamlico all	Nitrogen	$9.07	$8.28	-$0.79	-9%	-1.13%
Tar-Pamlico all	Phosphorus	$142.02	$117.96	-$24.06	-17%	-2.29%

4.2.4.2 RATE OF INCREASE FOR OFFSET CREDIT COSTS

The rate of cost increases for offset credits is difficult to reliably predict, as it is subject to a variety of market forces. Farmers allowing permanent easements on their land must factor in opportunity costs associated with the loss of arable land. Because acquisition of land or property rights is often a significant portion of an offset project, costs are likely to fluctuate in response to both local real estate and international commodity markets. One possibility is that prices may increase as the most readily available project opportunities are taken. However, the nutrient offset market itself is relatively young, and as the market matures it is also possible that more competitive pressure and improved restoration techniques may result in more cost-effective projects. Finally, new practices supporting the generation of offset credits may be approved in the future and the value of existing nutrient reduction practices approved by the Division may also change in light of future scientific findings. In sum, the direction and magnitude of long term offset credit cost trends is largely speculative, but other sources of information can also shed some light.

Nutrient offset costs have been calculated by the Division of Mitigation Services using the same method since 2010, which provides some insights into historical credit pricing changes. Credit price changes since that time are reflected in Table 4-3. No clear trend in annual growth rates is evident, though any such change may be mildly negative for both nutrients and in both basins.

Another line of evidence that can be used to estimate future project (and thus credit) costs is the composite USACE Civil Works Construction Cost Index[58], which is used by the Division of Mitigation Services in its pricing methodology. This document uses a 2% annual growth rate for cost projections beyond 2018,[59] though it also cautions that "while historic projections are reliable to update project costs, forecasting beyond two years may be unreliable."[60]

[58] Civil Works Construction Cost Index System (CWCCIS), U.S. Army Corps of Engineers. March 31, 2017. Accessed on July 27, 2018 at https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1304.pdf?ver=2017-11-17-073237-627.

[59] See table A-2.

[60] *Id.* at page 2.

Weighing the above sources of historical information and cost projections, it is difficult to project with confidence whether offset costs will deviate significantly from future estimates of inflation. Therefore, no specific adjustment is provided for this analysis.

4.2.4.3 NITROGEN ALLOCATION COSTS

Nitrogen allocation is traded among members of the Neuse River Compliance Association, which is comprised of most major wastewater dischargers within that basin. From 2004 to 2017, 30 temporary nitrogen leases and 7 permanent nitrogen sales have occurred in the Neuse basin. These transactions offer some insights into the pricing market for allocation.

Nitrogen leases have not settled around a single price over time. Transactions from 2005-2007 were conducted at prices between $1.50 and $3.00 per pound of nitrogen. Since 2008, prices have ranged from $4 to $9, with an average cost of $5.95 over that time period. Prices tend to be fixed depending on the seller in most cases, and sales at both $4.00 and $9.00 per pound occurred every year between 2014 and 2017.

Nitrogen leases conducted among NRCA members do have one substantial difference compared to a lease that would be required to support a new or expanding facility in the Neuse River basin. Nitrogen leases among NRCA members occur at the end of the compliance year, where compliance by the lessor has been assured. However, to lease allocation to a new or expanding facility, the lessor's permitted nutrient limit would have to be reduced for the duration of the lease period. This would result in some degree of additional risk of exceeding permit limits and would likely increase the cost of allocation. Due to this difference, rather than using the average allocation price above, the highest figure of $9 per pound is used for this analysis.

Six permanent nitrogen allocation sales have occurred among NRCA members between 2004 and 2012. These sale prices have ranged from $275 to $491 per pound per year. The average annual sale price for all transactions is $382.92 per pound, and the average annual sale price for the two transactions since 2008 is $350.64. A more conservative default value of $382.92 per pound will be used for this analysis.

4.2.4.4 RATE OF INCREASE FOR NITROGEN ALLOCATION COSTS

Very little information is available to project how allocation pricing may change in the future. With rapid population growth and increasing wastewater flows in the Neuse basin, many facilities may see increased nutrient inputs into their facilities. On the other hand, nutrient loading still has not seen a substantial uptick since total nitrogen limits became effective in 2003 due to increasing wastewater treatment efficiencies. With half or more of the waste load allocation unused in the Neuse basin each year, there appears to be considerable room to accommodate new or expanding facilities in the foreseeable future. As with nutrient offset costs, it is difficult to project with confidence whether costs associated with allocation acquisition deviate significantly from future estimates of inflation and therefore no specific adjustment is provided for this analysis.

4.2.4.5 EXPANSION EFFICIENCY

New or expanding facilities for these scenarios are assumed to be constructed to meet a 3 mg/L TN efficiency standard. This represents a technologically achievable treatment level and it is also generally consistent with average performance of members of the Neuse River Compliance Association.

For the proposed rule, facilities demonstrating that they can perform more efficiently than this standard have the option of obtaining less nitrogen or phosphorus allocation, thus reducing required expenditures on offsetting allocation or nutrient credits. This option provides additional flexibility to the regulated community and potentially

provides an incentive to treat wastewater more efficiently.

4.2.4.6 POINT TO NONPOINT SOURCE TRADING RATIO

Under the proposed nutrient offset rule, nutrient offset credits generated by nonpoint sources are subject to a trading ratio to account for relative uncertainty in comparison to point source nutrient increases. The default ratio for this calculation is 1.1 to 1 as proposed in this rule and the nutrient offset rule.

4.2.5 EXAMPLE COSTS TO WASTEWATER TREATMENT FACILITIES UNDER PROPOSED NEUSE WASTEWATER RULE

Fiscal analyses for three new or expanding facility scenarios are shown below. Where applicable, the tables below use bold text to identify the most cost effective nutrient offset option for wastewater facilities for each case. Importantly, facilities may choose to utilize any single option or a combination of options to meet their offset needs.

4.2.5.1 LARGE MUNICIPAL FACILITY EXPANSION, 2038 (SCENARIO 1)

This scenario evaluates the effects of rule changes for a large wastewater facility expansion occurring 20 years into the future. Such a scenario loosely approximates conceptual planning projections from the City of Raleigh regarding the potential need for increased nutrient limits around the year 2040. In 2017 Raleigh's largest facility, the Neuse River Resource Recovery Facility, discharged 61% of its permitted flow (46 of 75 MGD).

After the expansion in this theoretical scenario, the facility would serve 143,000 new residents based on per capita water use of 70 gallons per day. The scenario details costs over a seventy-year period, with plant operation beginning in year 20 and costs tabulated through year 70.

TABLE 4-4 INPUT PARAMETERS, NEUSE LARGE MUNICIPAL FACILITY EXPANSION PERMITTED IN 2038 (SCENARIO 1)

Plant size (flow) increase at capacity (MGD)	10
Plant efficiency (mg/L TN)	3.0
Annual nutrient offset cost (lbs. N)**	$21.34
Permanent nutrient offset cost (lbs. N/yr)	$640.20
Annual allocation lease cost (lbs. N at estuary)	$9.00
Permanent allocation sale cost (lbs. N/yr at estuary)	$382.92
Per capita water use (gpd)***	70
Point source delivery percentage	50%
PS: NPS trading ratio (x:1)	1.10
Discount rate	7%
Years until initial operation (year 0)	20

Results of this scenario indicate that lease allocation from other facilities in the basin is the most cost effective option. The costs for the nutrient offset credit option have been reduced more than three-fold due to proposed changes in the rule. However, as shown in Table 4-5, the nutrient offset option still remains an order of magnitude costlier than the allocation lease option and several times more expensive than the allocation purchase option.

TABLE 4-5 COSTS TO SECURE NUTRIENT ALLOCATION FOR SCENARIO 1 (70 YEARS, NPV)

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Proposed rule	**$1,121,908**	$2,893,420	$10,642,453
No action alternative	**$1,121,908**	$2,893,420	$34,186,437
Policy alternative: no tiered offset acquisition	**$1,787,248**	$4,518,379	$16,619,309
Policy alternative: no permanent credits	**$1,121,908**	$2,893,420	$12,603,316
Policy alternative, proposed with 3:1 offset ratio	**$1,121,908**	$2,893,420	$29,024,872
Policy alternative, proposed with 2.5:1 offset ratio	**$1,121,908**	$2,893,420	$24,187,393
Policy alternative, proposed with 2:1 offset ratio	**$1,121,908**	$2,893,420	$19,349,915
Policy alternative, proposed with 1.77:1 offset ratio	**$1,121,908**	$2,893,420	$17,124,675
Policy alternative, proposed with 1.2:1 offset ratio	**$1,121,908**	$2,893,420	$11,609,949
Policy alternative, proposed with 1:1 offset ratio	**$1,121,908**	$2,893,420	$9,674,957

* New permitted loading is 91,323 lbs. N/yr.

The policy alternatives above also show the relative impact of various changes to the nutrient offset credit option. Allowance of permanent offset credits provides a relatively modest change in relation to the cost reductions resulting from the allowance of tiered payments and the amended trading ratio. The figures in Table 4-6 were calculated by comparing the costs of the proposed rule with various policy alternatives with one rule change omitted. For example, the cost to acquire nutrient offset credits in this scenario for the proposed rule would be $10,642,453, but if permanent credits were not allowed the cost would be $12,603,316, a difference of $1,960,863. Due to multiple rule changes and the fact that the financial models used for this analysis are not linear, the cost savings for each individual rule adjustment do not sum to the total cost savings between the

existing and proposed rule. Therefore, an additional category entitled “synergistic effects” was added to account for the difference.

TABLE 4-6 COST SAVING AMENDMENTS AND RELATIVE IMPACT FOR SCENARIO 1, PROPOSED VS. EXISTING RULES (NPV)

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Permanent credits allowed	No change	No change	$1,960,863
Tiered offset acquisition	No change	No change	$5,976,856
PS: NPS trading ratio from 2 to 1.1	No change	No change	$8,707,462
Synergistic effects	No change	No change	$6,898,802
Total savings	**No change**	**No change**	**$23,543,983**

4.2.5.2 NEW INDUSTRIAL FACILITY (SCENARIO 2).

Scenario 2 represents a new industrial wastewater facility with 1 MGD flow, permitted and operated immediately. Offset costs associated with this facility are estimated from years 0-50.

TABLE 4-7 INPUT PARAMETERS, NEUSE NEW INDUSTRIAL FACILITY PERMITTED IN 2018 (SCENARIO 2)

Plant size (flow) increase at capacity (MGD)	1
Plant efficiency (mg/L TN)	3.0
Annual nutrient offset cost (lbs. N)**	$21.34
Permanent nutrient offset cost (lbs. N/yr)	$640.20
Annual allocation lease cost (lbs. N at estuary)	$9.00
Permanent allocation sale cost (lbs. N/yr at estuary)	$382.92
Per capita water use (gpd)***	70
Point source delivery percentage	50%
PS: NPS trading ratio (x:1)	1.10
Discount rate	7%
Years until initial operation (year 0)	0

TABLE 4-8 COSTS TO SECURE NUTRIENT ALLOCATION FOR SCENARIO 2 (50 YEARS)

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Proposed rule	**$434,143**	$1,119,662	$4,118,294
No action alternative	**$434,143**	$1,119,662	$13,229,072
Policy alternative: no tiered offset acquisition	**$691,609**	$1,748,470	$6,431,148
Policy alternative: no permanent credits	**$434,143**	$1,119,662	$4,877,086
Policy alternative, proposed with 3:1 ratio	**$434,143**	$1,119,662	$11,231,710
Policy alternative, proposed with 2.5:1 ratio	**$434,143**	$1,119,662	$9,359,758
Policy alternative, proposed with 2:1 ratio	**$434,143**	$1,119,662	$7,487,806
Policy alternative, proposed with 1.77:1 ratio	**$434,143**	$1,119,662	$6,626,709
Policy alternative, proposed with 1.2:1 ratio	**$434,143**	$1,119,662	$4,492,684
Policy alternative, proposed with 1:1 ratio	**$434,143**	$1,119,662	$3,743,903

* New permitted loading is 9,132 lbs. N/yr.

TABLE 4-9 COST SAVING AMENDMENTS AND RELATIVE IMPACT FOR SCENARIO 2, PROPOSED VS. EXISTING RULES

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Permanent credits allowed	No change	No change	$758,792
Tiered offset acquisition	No change	No change	$2,312,855
PS: NPS trading ratio from 2 to 1.1	No change	No change	$3,369,513
Synergistic effects	No change	No change	$2,669,619
Total savings	**No change**	**No change**	**$9,110,779**

4.2.5.3 MID-SIZED FACILITY EXPANSION, 2028 (SCENARIO 3)

This expansion scenario is potentially reflective of smaller municipalities' needs in the Neuse Basin. In addition to Raleigh's major facility above, 4 other plants were discharging at greater than 60% of their permitted flows. The highest ratio was for the City of Havelock, at 68%, but its population is slightly declining and expansion does not appear to be necessary.

The potential expansion scenario below might be more akin to Clayton's Little Creek WWTP, which discharged at 64% of its flow limit and 92% of its individual nitrogen limit in 2017. According to 2017 U.S. Census estimates, Clayton grew by 5.65% in 2017 and 32.1% since 2010. Due to this high growth rate, a conservative projection for new operation in 10 years is provided as well as other parameters reflective of Clayton's location in the Neuse 01 subbasin. The scenario reflects an initial permitting year of 2028 and 50 years of operation beyond that time.

TABLE 4-10 INPUT PARAMETERS, NEUSE MID-SIZED FACILITY EXPANSION PERMITTED IN 2028 (SCENARIO 3)

Plant size (flow) increase at capacity (MGD)	2
Plant efficiency (mg/L TN)	3.0
Annual nutrient offset cost (lbs. N)**	$21.34
Permanent nutrient offset cost (lbs. N/yr)	$640.20
Annual allocation lease cost (lbs. N at estuary)	$9.00
Permanent allocation sale cost (lbs. N/yr at estuary)	$382.92
Per capita water use (gpd)***	70
Point source delivery percentage	50%
PS: NPS trading ratio (x:1)	1.10
Discount rate	7%
Years until initial operation (year 0)	10

TABLE 4-11 COSTS TO SECURE NUTRIENT ALLOCATION FOR SCENARIO 3 (60 YEARS)

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Proposed rule	**$441,392**	$1,138,359	$4,187,063
No action alternative	**$441,392**	$1,138,359	$13,449,979
Policy alternative: no tiered offset acquisition	**$703,158**	$1,777,667	$6,538,539
Policy alternative: no permanent credits	**$441,392**	$1,138,359	$4,958,526
Policy alternative, proposed with 3:1 ratio	**$441,392**	$1,138,359	$11,419,263
Policy alternative, proposed with 2.5:1 ratio	**$441,392**	$1,138,359	$9,516,053
Policy alternative, proposed with 2:1 ratio	**$441,392**	$1,138,359	$7,612,842
Policy alternative, proposed with 1.77:1 ratio	**$441,392**	$1,138,359	$6,737,365
Policy alternative, proposed with 1.2:1 ratio	**$441,392**	$1,138,359	$4,567,705
Policy alternative, proposed with 1:1 ratio	**$441,392**	$1,138,359	$3,806,421

* New permitted loading is 18,265 lbs. N/yr.

TABLE 4-12 COST SAVING AMENDMENTS AND RELATIVE IMPACT FOR SCENARIO 3, PROPOSED VS. EXISTING RULES

Cost NPV	Allocation Lease	Allocation Purchase	Offset Credit
Permanent credits allowed	No change	No change	$771,463
Tiered offset acquisition	No change	No change	$2,351,476
PS: NPS trading ratio from 2 to 1.1	No change	No change	$3,425,779
Synergistic effects	No change	No change	$2,714,198
Total savings	**No change**	**No change**	**$9,262,916**

4.2.6 SUMMARY OF COST SAVINGS TO NEUSE WASTEWATER DISCHARGERS

All scenario results lead to some general inferences about the fiscal impact of changes to the Neuse wastewater rule. Substantial offset credit cost savings result from complementary changes in the Neuse wastewater rule and the nutrient offset rule. Yet in all scenarios and for all policy alternatives, the lease or purchase of nutrient allocation is much less expensive than the acquisition of nutrient offset credits. Therefore, despite considerable cost reductions for the nutrient offset option, these rule amendments are unlikely to result in additional cost savings for new or expanding dischargers unless market conditions change considerably.

4.2.7 COSTS TO THE GENERAL PUBLIC

The costs for new and expanding wastewater treatment plants can be financed in many ways. Costs are typically borne by ratepayers and/or residents of the jurisdiction being served, but state and federal grant and loan programs can also provide support.

The current rules require allocation or offsets to be secured prior to the authorization to construct a new facility or expansion. As loans are repaid and new customers are served, decisions made by a local government or utility regarding expansion financing mechanisms, loan repayment terms, rate structures and connection fees will determine the extent to which costs will be recovered by the newly served population or absorbed more broadly by all customers or local residents.

The proposed rules will not change the cost to wastewater treatment facilities (and ultimately ratepayers) if facilities choose to offset the additional nutrient loads through allocation purchases or allocation leases. By lowering the cost of offset credits, the proposed rules create cost savings for rate payers, should the facility choose to utilize credits. However, allocation leases and purchases remain less costly than offset credits.

As an imperfect indicator of cost savings to the public, we provide a per capita net present value estimate for the increased population potentially served by the new or expanded facility over a fifty-year timeframe. Cost savings may be lower than presented below if savings are shared across all ratepayers rather than the newly-served population alone. Scenarios 1 and 3 were included because they reflect domestic wastewater facilities, while scenario 2 was omitted as an industrial facility.

TABLE 4-13: NET PRESENT VALUE PER NEW CUSTOMER SERVED

	Scenario 1	Scenario 3
Existing and proposed rule, allocation lease	**$7.85**	**$15.45**
Existing and proposed rule, allocation purchase	$20.25	$39.84
Existing rule, offset credits	$239.31	$470.75
Proposed rule, offset credits	$74.50	$146.55
Existing vs. proposed rule, cost savings to acquire allocation	$0	$0
Cost Savings over 50 years IF only offset credits are utilized	$165.8	$324.20

4.2.8 COSTS TO STATE GOVERNMENT

Costs attributed to changes in the Neuse wastewater rule are nil or negligible to state government with one exception. Potential costs to state government associated with the 1.1 to 1 point to nonpoint source trading ratio are discussed in Section 5.3.2.

4.3 TAR-PAMLICO WASTEWATER RULE

4.3.1 NO ACTION ALTERNATIVE: PRESENT RULE

The Tar-Pamlico Non-association rule generally governs new and expanding wastewater facilities in the Tar-Pamlico River Basin that are not members of the Tar-Pamlico Basin Association. The rule itself does not impose restrictions on wastewater facilities operating within their permitted parameters. However, it does establish nutrient offset requirements for new or expanding facilities to address compliance with the Tar-Pamlico estuary TMDL. This rule, in place for more than two decades, has never been utilized by a new or expanding facility. However, that is not to imply that it will not be utilized in the future.

Advances in the scientific understanding of nutrient reduction practices as well as the observation of existing nutrient offset markets nationwide have illuminated many aspects of this rule that are now obsolete or out of step with applicable authorities. Various facets of the existing rule result in a situation where the required offset payments are insufficient to finance the actual nutrient load reductions envisioned in the original rule. This occurs due to a combination of several features of the rule, including a flat payment rate for nitrogen and phosphorus, faulty assumptions underpinning that rate, and an allowance of up to 0.5 MGD of expansion with no offsets required in some circumstances. Each issue is addressed in turn below.

The rule requires a payment to the Division of Water Resources by the permit applicant at a fixed amount set in rule. This figure was based on relatively current research at the time, but it was also established before any credible nutrient trading programs were in existence. North Carolina now has active offset credit trading markets in several basins, including the Tar-Pamlico basin. A trading market, in addition to providing flexibility for regulated parties, also serves to establish a market price for nitrogen and phosphorus offset credits. Public prices are available from the Division of Mitigation Services, with these rates determined by their actual costs to produce. Credits may be more or less expensive from privately-operated nutrient offset banks, but these rates are not public and are subject to change. To promote the functioning of this market and to ensure new and expanding facilities are fully offsetting their increased loads, the proposed rule update requires the acquisition of offset credits at market rates rather than the payment of a specified amount.

The offset rate referenced by the existing rule is $29 per kilogram or $13.18 per pound. The figure itself is provided in another rule, 15A NCAC 02B .0237, which is proposed for repeal. This value was estimated in a report by Tippett and Dodd (1995) with the installation of anaerobic lagoons as the supporting best management practice. Both the report and the rule clearly state that this value is reflective of nitrogen reductions only. When compared to the present in-lieu fee cost of $8.50 per pound nitrogen in DMS's in lieu fee program, this figure represents a reasonable estimate of nitrogen reduction costs, even if coincidentally.

However, this figure is more than an order of magnitude too low for phosphorus credits, which are presently available for $212.61 per pound in the Tar-Pamlico basin. In simplistic terms, the equations in the existing rule simply add nitrogen and phosphorus requirements together before multiplying by the required payment cost. By

equating the two, a major underestimate of phosphorus offset costs was incorporated into the rule, ensuring any payment received is not sufficient to fully offset new phosphorus discharges.

The third feature of the rule that allows for less than full offset for increased nutrient loading is an allowance of up to 0.5 MGD that may not require nutrient offset purchases. For consistency purposes, this provision was also included in the newly proposed Tar-Pamlico Wastewater rule. However, this provision (existing and proposed) is inconsistent with the proposed Neuse wastewater rule, and as a policy alternative the Division provides a scenario in which all nutrient increases are offset (see Section 4.3.5.2).

Any offset payments required pursuant to this rule would be directed to a "nonpoint source control program(s) approved by the Division of Water Quality." Most likely, such payments would be directed toward nutrient offset credits generated by the Division of Mitigation Services. The costs of both nitrogen and phosphorus credits are publicly available and are established according to a rule-based actual cost method. For this analysis, payments would be applied to purchase nitrogen and phosphorus offset credits such that they are purchased at a 6:1 ratio, equal to the ratio of nutrient increases required to be offset in the existing rule.

4.3.2 PROPOSED TAR-PAMLICO WASTEWATER RULE

The proposed rule provides market-based nutrient offset options requiring all increasing nutrient loads from new or expanding facilities to be offset by the acquisition of an equivalent amount of allocation and/or offset credit. Where offset credits are purchased, they will be subject to a point to nonpoint source trading ratio as proposed in the nutrient offset rule.

The proposed rule expands its coverage beyond non-Tar-Pamlico Basin Association (TPBA) members to include all new and expanding facilities in the basin. The new inclusion of TPBA member facilities in the rule's coverage is intended to provide a clear regulatory avenue for new or expanding facilities that is not provided in the Phase IV TPBA agreement. As reflected in the Phase IV agreement, 98.7 of permitted municipal and domestic flows come from TPBA members.[61] Because the option to build new facilities or expand in this impaired watershed is not clearly defined and thus could be denied for TPBA members, their inclusion in the rule likely result in a net economic benefit, evidenced by the population or industrial growth potentially served through expanded wastewater service.

Another key feature of the proposed rule is that nutrient offset credits may be purchased only as necessary to offset actual nutrient increases expected from the facility. Whereas the existing rule requires nutrient offset credit to be secured at a rate 6 mg/L TN and 1 mg/L TP for domestic wastewater facilities, the proposed rule only requires offsets based on the proposed efficiency of the plant. For example, an expanding plant that is capable of meeting 2.5 mg/L TN and 0.2 mg/L TP targets would be required to secure less than half as many offset credits as nominally required in the existing rule.

The proposed rule also requires new domestic facilities to treat to a standard of 3.0 mg/L of TN and 0.5 mg/L TP, while new industrial facilities must use best available technology. For non-association dischargers, this level is more stringent than the implied requirements of the current rule. This change is incorporated for several reasons,

[61] Phase IV Tar-Pamlico Basin Association Agreement at 8. July 2015. Last accessed December 3, 2018 at https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Tar%20Pamilco/TarPamPhaseIVAgreementsigned.pdf.

including advancements in wastewater treatment technology since this rule was implemented in 1997, the fact that nutrient loading to the estuary remains above TMDL levels, and the consideration that domestic expansions in this basin appear to be unlikely for twenty years or more. This proposed change was also foreshadowed in the 2015 TPBA agreement, which indicates that the technology-based standards in the current rule are an "out-of-date measure for BAT for domestic facilities."[62]

Finally, consistent with the current rule for non-association members and as newly applied to TPBA members, the technology-based treatment requirement may be bypassed or eased through the provisions of sub-item (5)(h), which allows for expansion with no nutrient mass limit increases (and thus no offsets) if effluent can be treated to proportionally reduced nutrient concentrations.

4.3.3 ANALYTICAL APPROACH

As in the Neuse analysis, efforts to predict the size, frequency, and timing of new and expanding facilities at the basin scale are eschewed in favor analyzing various realistic permitting scenarios at the facility scale.

From 1990-2010, the average annual growth rate in the Tar-Pamlico Basin was 0.98% (Albemarle-Pamlico Ecosystem Assessment, 2012). Individual local governments and independent facilities typically engage in long range planning to ensure wastewater needs continue to be met. DWR is not presently aware of any pressing domestic expansion needs in this basin. Furthermore, countervailing trends may mitigate the need for expansion at existing facilities, including water conservation practices, declining population in some areas, and improved nutrient treatment technology.

TABLE 4-14: POPULATION GROWT IN THE TAR-PAMLICO RIVER BASIN. ADAPTED FROM 2012 ALBEMARLE-PAMLICO ECOSYSTEM ASSESSMENT.

Basin or Subbasin	1990 Population	2010 Population	Annual growth rate
all	368,492	447,943	0.98%
01	160,276	197,886	1.06%
02	35,257	36,645	0.19%
03	125,623	162,763	1.30%
04	38,331	40,983	0.34%
05	9,005	9,666	0.35%

Most major existing dischargers in this basin are constituent members of the Tar-Pamlico Basin Association. In 2017 their combined annual flow was 27.4 MGD out of a collectively permitted flow of 61.4 MGD. From 1991 to 2017, no clear trends in flow are apparent. From a nutrient performance perspective, in 2017 these facilities collectively discharged 63.3% of their permitted TN load and 65.9% of their permitted TP load. Additional TPBA performance data is provided in Table 4-15.

[62] Id. at 20.

TABLE 4-15: TAR-PAMLICO BASIN ASSOCIATION NUTRIENT PERFORMANCE, 2017

TPBA Performance, 2017	TN	TP
Permitted Cap (lbs.)	891,271	161,070
Loading (lbs.)	564,423	106,117
Cap Room (lbs.)	326,848	54,953
% TPBA Cap	63.3%	65.9%
Average Effluent Concentration (mg/L)	6.78	1.05

The effects of this rule change on potential new industrial sources of wastewater are even harder to forecast, as discussed in the Neuse wastewater analysis. Again, to better illustrate the effects of changes to these rules and provide accompanying policy analysis, various realistic permitting scenarios are analyzed at the facility scale.

4.3.4 KEY ASSUMPTIONS

4.3.4.1 LEASE OPTIONS

The existing rule is interpreted such that nutrient offset payments are required, excluding allocation lease or sale options.

4.3.4.2 NITROGEN ALLOCATION COSTS

No market transactions have occurred within the Tar-Pamlico Basin that illuminate the value of a nitrogen allocation sale or lease. Average costs in the Neuse basin are used for sales ($382.92/lb. N) and maximum costs for leases ($9.00/lb. N/year) are used as nitrogen estimates. Tar-Pamlico facilities collectively are closer to their discharge caps in both absolute and percentage terms, potentially suggesting higher marginal value of remaining allocation. However, these facilities on average are also performing less efficiently than their Neuse counterparts, suggesting a lower marginal cost rate to achieve further nutrient reductions. For the purposes of this analysis, those considerations are considered to counterbalance and the Neuse nitrogen rates are adopted for this analysis.

4.3.4.3 PHOSPHORUS ALLOCATION COSTS

No market transactions have occurred within the Tar-Pamlico Basin that illuminate the value of a phosphorus allocation sale or lease. Moreover, phosphorus allocation trades have not occurred in other similarly situated basins.

Most if not all major facilities within the Tar-Pamlico basin have the existing infrastructure and demonstrated historical capability to treat wastewater to a concentration of 1 mg/L TP. However, in recent years some facilities have treated to a less stringent standard while remaining collectively within their phosphorus limits, which saves money on chemical treatment costs.

Phosphorus reductions created by improved treatment create an opportunity to sell or lease an equivalent amount of allocation to other facilities within the basin. To estimate a potential allocation cost figure, phosphorus

treatment cost estimates were adapted from a working paper by Jiang et al. (2005)[63]. This source generally seeks to estimate the capital, operating, and maintenance costs of transitioning from treatment from phosphorus concentrations higher than 2 mg/L to various treatment scenarios ranging from 2 mg/L TP to 0.05 mg/L TP. Because existing infrastructure is in place to support treatment to a 1 mg/L standard in the Tar-Pamlico basin and because Jiang et al. attributes the primary cost between these treatment levels to the addition of more alum, the cost differences between 2 mg/L and 1 mg/L treatment scenarios were determined to be a reasonable estimate of marginal phosphorus reduction costs. The cost of a 10 MGD facility to improve its performance from 2 mg/L TP to 1 mg/L TP is estimated at $2.13-$3.95 per pound. Taking the high estimate, adding administrative costs and likely additional incentives necessary to induce trading, a phosphorus lease value of $5 per pound will be utilized for this analysis. TPBA performance data from 2017 indicate that analogous opportunities for phosphorus reductions of this degree presently exist within the basin.

The cost ratio for leases between nitrogen and phosphorus is 1.8:1. Applying this ratio to the cost of nitrogen allocation sales, 382.92/lb. N, a phosphorus allocation sale price is estimated at $212.73.

4.3.4.4 CREDIT SHORTFALL CALCULATIONS FOR EXISTING RULE

Based on current nutrient offset credit rates, the existing arrangement for meeting offset requirements in the Tar-Pamlico basin results in a shortfall in actual nutrient reductions. For domestic facilities, credit shortfalls are calculated assuming the new facility meets the 6 mg/L TN and 1 mg/L TP efficiency standard. In contrast to domestic facilities, industrial facilities in the proposed and existing rules only require offsets to be purchased at the efficiency represented by best available technology (BAT). As such, no overestimate will occur because the allocation needed and the allocation purchased will be the same.

4.3.4.5 EXPANSION EFFICIENCY

New or expanding facilities for these scenarios are assumed to be constructed to meet a 3 mg/L TN and 0.5 mg/L TP efficiency standard, which represent technologically achievable treatment levels.

For the proposed rule, facilities demonstrating that they can perform more efficiently than this standard have the option of obtaining less nitrogen or phosphorus allocation, thus reducing required expenditures on offsetting allocation or nutrient credits. As such, it provides additional flexibility to the regulated community and potentially provides an incentive to treat wastewater more efficiently.

4.3.4.6 NEW AND EXPANDING FACILITY NUTRIENT TREATMENT COSTS

The method for evaluating wastewater treatment costs to account for enhanced nutrient removal over that required in the current rule are adopted from the Chesapeake Bay Program's approach.[64] Current rules are assumed to require treatment levels approximately equivalent to Tier 3 for nitrogen (5.0 mg/L TN) and Tier 2 for phosphorus (1 mg/L TP). Expansion costs for the scenarios provided rely on methodologies provided in the

[63] F. Jiang, M.B. Beck, R.G. Cummings, K. Rowles, and D. Russell. Estimation of Costs of Phosphorus Removal In Wastewater Treatment Facilities: Adaptation Of Existing Facilities. Water Policy Working Paper #2005-011. February 2005. https://pdfs.semanticscholar.org/91d8/73a8ab8f12a7faffacf7f05f308a500169e0.pdf.

[64] Chesapeake Bay Program. Nutrient Reduction Technology Cost Estimations for Point Sources in the Chesapeake Bay Watershed. November 2002. Accessed Nov. 27, 2018 at https://www.chesapeakebay.net/content/publications/cbp_13136.pdf.

document to upgrade to Tier 4 for nitrogen (3.0 mg/L TN) and Tier 3 for phosphorus (0.5 mg/L TP). The costs estimated using this method reflect year 2000 dollars. To estimate 2018 costs, the composite USACE Civil Works Construction Cost Index was used to provide equivalent costs between 2000 and 2018.[65] Use of the index resulted in a 73% increase in costs between Q3 of 2000 and Q4 of 2018. Future costs were then discounted using the statutorily required 7% annual discount rate.

4.3.4.7 OTHER ASSUMPTIONS

Assumptions governing the increasing costs of credit over time, the costs of allocation over time, and the default point to nonpoint source ratio are utilized as in the Neuse analysis. All scenarios reflect costs associated with changes in the application of the rule to non-TPBA dischargers only. TPBA members do not presently have a regulatory option to authorize new and expanding facilities, so the rule results in a new net economic benefit to TPBA members.

4.3.5 EXAMPLE COSTS TO WASTEWATER TREATMENT FACILITIES UNDER PROPOSED RULE

4.3.5.1 MID-SIZED FACILITY EXPANSION, 2038 (SCENARIO 4)

Scenario 4 represents a planned, mid-sized domestic wastewater facility expansion from 2 MGD to 4 MGD. After the expansion, the facility would serve 57,000 total residents and 29,000 new residents based on per capita water use of 70 gallons per day. Such an increase would be relatively large in relation to facilities in this basin, as a 4 MGD facility would become the 4th largest in the basin after Rocky Mount, Greenville, and Tarboro. Four other facilities have a flow limit between 2 and 4 MGD. All facilities in the basin were utilizing 62% or less of their allocated flow in 2017. With modest population growth rates and no clear trend in flows in this basin, an expansion of domestic wastewater facilities before 2038 is difficult to foresee. Therefore, this expansion scenario would occur in 20 years. Offset costs associated with this expansion are estimated from years 20-70.

[65] Civil Works Construction Cost Index System (CWCCIS), U.S. Army Corps of Engineers. March 31, 2017. Accessed on July 27, 2018 at https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1304.pdf?ver=2017-11-17-073237-627.

TABLE 4-16: INPUT PARAMETERS, TAR-PAMLICO MID-SIZED FACILITY EXPANSION PERMITTED IN 2038 (SCENARIO 4)

Permitted flow after expansion (MGD)	4
Permitted flow before expansion (MGD)	2
Plant efficiency N (mg/L)	3.0
Plant efficiency P (mg/L)	0.5
Annual nitrogen offset cost (lbs. N)**	$8.50
Annual phosphorus offset cost (lbs. P)	$212.61
Permanent nitrogen offset cost (lbs. N/yr.)	$255.00
Permanent phosphorus offset cost (lbs. P/yr.)	$6,378.30
Annual N allocation lease cost (lbs. N)	$9.00
Annual P allocation lease cost (lbs. P)	$5.00
Permanent N allocation sale cost (lbs. N/yr.)	$382.92
Permanent P allocation sale cost (lbs. P/yr.)	$212.73
Per capita water use (gpd)***	70
PS: NPS trading ratio (x:1)	1.1
Discount rate	7%
Years until initial operation (year 0)	20

Under the existing rule, offset costs would be $1.2 million with 18% of new loading being offset. For the proposed rule, the most cost-effective offset option would be an allocation lease from another facility at a cost of $490,000 at estimated market rates.

TABLE 4-17: OFFSET COSTS FOR SCENARIO 4 (70 YEARS)

	Current rule	**Proposed rule: allowable options**		
	Offset Payment	**Allocation Lease**	Allocation Purchase	Offset Credit
Cost NPV	$1,221,700	**$490,315**	$1,264,532	$4,382,157
Total NPV per new customer at capacity	$42	**$17**	$44	$153
Maximum Annual N credit shortfall	30,135	**0**	0	0
Maximum Annual P credit shortfall	5,023	**0**	0	0
% of new loading offset (same for N and P)	18%	**100%**	100%	100%

* New permitted loading is 18,265 lbs. N/yr., 3,044 lbs. P/yr.

The acquisition of nutrient offset credits is the most expensive compliance option, with costs estimated at $4.4 million. Alternate trading ratios would result in costs between $4.0 million and $12.0 million.

Finally, this scenario potentially requires installation of enhanced nutrient removal technology. No additional capital costs would be incurred for phosphorus treatment, but annual operation and maintenance costs are estimated at $4,076 in 2038. Capital costs for nitrogen removal are estimated at $1,055,149 in 2038 dollars, with annual operation and maintenance costs for nitrogen removal at $43,606 in 2038. The net present value of total costs from 2038-2088 is estimated at $1,759,268 above the treatment standard required by the current rule.

Factoring in cost savings resulting from offset acquisition under the current rule, the maximum net cost of the new rule for this scenario is $1,027,883. This cost may be reduced or eliminated if a facility is positioned to expand without requiring additional nutrient allocation pursuant to the provisions of sub-item (5)(h) of this rule.

TABLE 4-18: TRADING RATIO ALTERNATIVES FOR SCENARIO 4 (70 YEARS)

Ratio	Offset Credit
1 to 1	$3,983,779
1.1 to 1	$4,382,157
1.2 to 1	$4,780,535
1.77 to 1	$7,051,289
2 to 1	$7,967,558.59
2.5 to 1	$9,959,448
3 to 1	$11,951,337.89

* No change to cost of allocation lease or purchase options

4.3.5.2 SMALL FACILITY EXPANSION, 2028 (SCENARIO 5)

Scenario 5 represents a small domestic wastewater facility expansion from 0.1 MGD to 1 MGD. A potential scenario might entail the enlargement or reconstruction of a small package plant. After the expansion, the facility would serve 14,000 total residents and 13,000 new residents based on per capita water use of 70 gallons per day. The expansion would occur in 10 years. Offset costs associated with this expansion are estimated from years 10-60.

In this scenario, for both existing and proposed rules, nutrient offsets are not required for the discharged volume between 0.1 and 0.5 MGD. However, a policy alternative is demonstrated showing the cost increases associated with offsetting all nutrient increases. While no real world scenario is presently known, this scenario illustrates the relative fiscal effects of the potential allowance of up to 0.5 MGD for existing dischargers.

TABLE 4-19 INPUT PARAMETERS FOR TAR-PAMLICO BASIN SMALL FACILITY EXPANSION IN 2028 (SCENARIO 5)

Permitted flow after expansion (MGD)	1
Permitted flow before expansion (MGD)	0.1
Plant efficiency N (mg/L)	3.0
Plant efficiency P (mg/L)	0.5
Annual nitrogen offset cost (lbs. N)**	$8.50
Annual phosphorus offset cost (lbs. P)	$212.61
Permanent nitrogen offset cost (lbs. N/yr.)	$255.00
Permanent phosphorus offset cost (lbs. P/yr.)	$6,378.30
Annual N allocation lease cost (lbs. N)	$9.00
Annual P allocation lease cost (lbs. P)	$5.00
Permanent N allocation sale cost (lbs. N/yr.)	$382.92
Permanent P allocation sale cost (lbs. P/yr.)	$212.73
Per capita water use (gpd)***	70

PS: NPS trading ratio (x:1)	1.10
Discount rate	7%
Years until initial operation (year 0)	10
Years of operation	50

Offset costs would be $601,000 with 10% of new loading being offset. For the proposed rule, the most cost-effective offset option would be an allocation lease from another facility at a cost of $241,000 at estimated market rates. This would result in 56% of new loading being offset. A policy alternative that would result in all loading being offset would allow for the purchase of a nutrient offset lease for $434,000.

TABLE 4-20 OFFSET COSTS FOR SCENARIO 5 (60 YEARS)

	Current rule	**Proposed rule: allowable options**			**Policy alternative: all increases offset**		
	Offset Payment	**Allocation Lease**	Allocation Purchase	Offset Credit	Allocation Lease	Allocation Purchase	Offset Credit
Cost NPV	$600,817	$241,131	$812,025	$2,155,092	$434,036	$1,461,645	$3,879,165
Maximum Annual N credit shortfall	14,840	3,653	3,653	3,653	0	0	0
Maximum Annual P credit shortfall	2,473	609	609	609	0	0	0
% of new loading offset (same for N and P)	10%	56%	56%	56%	**100%**	100%	100%

* New permitted loading is 8,219 lbs. N/yr., 1,370 lbs. P/yr.

The acquisition of nutrient offset credits is the most expensive compliance option, with costs estimated at $2.2 million. Alternate trading ratios would result in costs between $2.0 million and $5.9 million.

TABLE 7: TRADING RATIO ALTERNATIVES FOR SCENARIO 5.

Ratio	**Offset Credit Cost NPV**
1 to 1	$1,959,174
1.1 to 1	$2,155,092
1.2 to 1	$2,351,009
1.77 to 1	$3,330,596
2 to 1	$3,918,348
2.5 to 1	$4,897,936
3 to 1	$5,877,522

* No change to cost of allocation lease or purchase options

This scenario also requires installation of enhanced nutrient removal technology. No additional capital costs would be incurred for phosphorus treatment, but annual operation and maintenance costs are estimated at $3,660 in 2028. Capital costs for nitrogen removal are estimated at $1,021,351 in 2028 dollars, with annual operation and maintenance costs for nitrogen removal at $56,910 in 2028. The net present value of total costs from 2028-2078 is estimated at $1,915,780 above the treatment standard required by the current rule. Factoring in cost savings

resulting from offset acquisition under the current rule, the maximum net cost of the new rule for this scenario is $1,556,094. This cost may be reduced or eliminated if a facility is positioned to expand without requiring additional nutrient allocation pursuant to the provisions of sub-item (5)(h) of this rule.

4.3.5.3 NEW INDUSTRIAL FACILITY (SCENARIO 6)

Scenario 6 represents a new industrial wastewater facility with 1 MGD flow, permitted and operated immediately. Offset costs associated with this facility are estimated from years 0-50.

TABLE 4-21 INPUT PARAMETERS FOR TAR-PAMLICO BASIN NEW INDUSTRIAL FACILITY IN 2018 (SCENARIO 6)

Permitted flow after expansion (MGD)	1
Permitted flow before expansion (MGD)	0
Plant efficiency N (mg/L)	3.2
Plant efficiency P (mg/L)	0.5
Annual nitrogen offset cost (lbs. N)**	$8.50
Annual phosphorus offset cost (lbs. P)	$212.61
Permanent nitrogen offset cost (lbs. N/yr)	$255.00
Permanent phosphorus offset cost (lbs. P/yr)	$6,378.30
Annual N allocation lease cost (lbs. N)	$9.00
Annual P allocation lease cost (lbs. P)	$5.00
Permanent N allocation sale cost (lbs. N/yr)	$382.92
Permanent P allocation sale cost (lbs. P/yr)	$212.73
Per capita water use (gpd)***	70
PS: NPS trading ratio (x:1)	1.10
Discount rate	7%
Years until initial operation (year 0)	0
Years of operation	50

Offset costs would be $2.4 million with 18% of new loading being offset. For the proposed rule, the most cost-effective offset option would be an allocation lease from another facility at a cost of $1.9 million at estimated market rates.

TABLE 4-22 OFFSET COSTS FOR SCENARIO 6

	Current rule	**Proposed rule: allowable options**		
	Offset Payments	**Allocation Lease**	Allocation Purchase	Offset Credit
Cost NPV	$2,363,796	**$1,006,568**	$2,595,957	$8,588,141
Maximum Annual N credit shortfall	15,068	**0**	0	0
Maximum Annual P credit shortfall	2,511	**0**	0	0
% of new loading offset (same for N and P)	18%	**100%**	100%	100%

* New permitted loading is 18,265 lbs. N/yr., 3,044 lbs. P/yr.

The acquisition of nutrient offset credits is again the most expensive compliance option, with costs estimated at $8.6 million. Alternate trading ratios would result in costs between $7.8 million and $23.4 million.

TABLE 4-23 TRADING RATIO ALTERNATIVES FOR SCENARIO 6

Ratio	Offset Credit (NPV)
1 to 1	$7,807,401
1.1 to 1	$8,588,141
1.2 to 1	$9,368,881
1.77 to 1	$13,819,099
2 to 1	$15,614,801.57
2.5 to 1	$19,518,502
3 to 1	$23,422,202.36

* No change to cost of allocation lease or purchase options

The characteristics of wastewater effluent and the methods by which it can be treated vary significantly among industries. The costs associated with industrial nutrient treatment vary significantly as well, and therefore no enhanced nutrient treatment costs are estimated for this scenario. However, similar to the prior two scenarios, it is likely that increased costs associated with enhanced nutrient treatment will result in a net cost increase.

4.3.6 COSTS TO THE GENERAL PUBLIC

The costs for new and expanding wastewater treatment plants can be financed in many ways. Costs are typically borne by ratepayers and/or residents of the jurisdiction being served, but state and federal grant and loan programs can also provide support. It is not clear to what extent grant or loan projects might support the acquisition of nutrient offset credits, though such funds would be available for infrastructure to enhance nutrient treatment at the facility itself and thereby reduce the magnitude of offset credits needed. As an indicator of costs to the public, we provide a per capita net present value estimate for the increased population served by the new or expanded facility. These costs are likely to be realized through rate or tax increases over time.

TABLE 4-24: NET PRESENT OFFSET COSTS PER NEW CUSTOMER SERVED

	Scenario 4	Scenario 5	Scenario 5 alternative
Existing rule, offset payments	$42.76	$42.06	n/a
Proposed rule, allocation lease	**$17.16**	**$18.75**	**$33.76**
Proposed rule, allocation purchase	$44.26	$48.36	$87.06
Proposed rule, offset credits	$153.38	$167.62	$301.71

TABLE 4-25: ADDITIONAL NUTRIENT TREATMENT COSTS PER NEW CUSTOMER SERVED (NET PRESENT VALUE)

	Scenario 4	Scenario 5
Existing rule	$0	$0
Proposed rule	**$61.58**	**$149.00**

4.3.7 COSTS TO STATE GOVERNMENT

Costs attributed to changes in the Neuse wastewater rule are nil or negligible to state government with one exception. Potential costs to state government associated with the 1.1 to 1 point to nonpoint source trading ratio are discussed in Section 5.3.2.

CHAPTER 5 NUTRIENT OFFSET RULE

5.1 NO ACTION ALTERNATIVE- PRESENT RULE

The nutrient offset rule generally establishes standards for the creation of nutrient offset credits by the Division of Mitigation Services and private nutrient offset providers. These credits are purchased by regulated parties to earn nutrient credit away from their project site when it provides a more cost-effective compliance option. The regulatory objective of this rule is to lower the costs of rule compliance while achieving equivalent nutrient reductions elsewhere. To meet this objective and ensure the integrity of the trading market, credited nutrient reductions must be equivalent in magnitude and certainty with the excess nutrient loading increases allowed by their use.

The nutrient offset rule is applicable in all nutrient strategy basins. It is commonly used by developers subject to new development rules in the Neuse, Tar-Pamlico, Falls Lake, and Jordan Lake nutrient strategies. It also provides an avenue for new or expanding wastewater dischargers to acquire nutrient allocation in the Neuse, Jordan Lake, and Falls Lake strategies. The offset rule does not apply to wastewater dischargers subject to the Phase IV Tar-Pamlico agreement, which contains a stand-alone offset program, or to other new or expanding wastewater dischargers in the Tar-Pamlico basin.

To generate offset credits, DMS and other providers must provide adequate financial assurances that the project will be installed and maintained [see (c)(2)], routinely provide credit transaction ledgers to the Division of Water Resources [see (c)(3)], allow state project inspections [see (c)(4)], and allow an on-site review prior to the implementation of any nutrient reduction project[see (c)(5)]. Most importantly, they must provide a project proposal containing sufficient documentation to support the proposed nutrient reduction value of the project for which credits will be assigned [see (c)(6)(A-F)].

In addition, the existing nutrient offset rule provides standards for the transaction of these credits to satisfy regulatory requirements. This includes geographic restrictions for nutrient credit trades [see (b)], establishment of credit rates and other conditions by DMS [see (d), (e)(1)-(2)], nutrient types for which credits must be purchased [see (e)(3)], and terms governing the acquisition of credit by developers [see (e)(4)-(5)] and wastewater dischargers [see (e)(6)].

Beyond the rule, the Division also has a number of policies and materials available to help streamline the credit generation process. Providers typically enter into a contractual mitigation banking instrument (MBI) with the Division, which is designed to address many of the legal requirements of the offset rule. Providers also submit a bank parcel development plan for each proposed offset bank, which provides technical justification for the project in accordance with (c)(6). While providers have the burden of demonstrating proposed nutrient reductions, they can rely on pre-approved nutrient reduction practices from the Division rather than providing their own justification. Finally, the Division provides a conservation easement template for providers and landowners to use to ensure projects are sustained for their planned life.

5.2 PROPOSED RULE

The nutrient offset rule was last amended in 2010. Since that time much has transpired in North Carolina's nutrient offset market as well as through implementation of nutrient offset trading programs throughout the country. Generally, proposed changes to the nutrient offset rule were designed to improve regulatory clarity and provide additional nutrient offset options to the regulated community at reduced or equivalent costs to the

present rules. A few substantial changes to the existing rule merit in-depth analysis, which is provided in Section 5.3. However, most rule changes have negligible financial effects that are addressed qualitatively in Section 5.4.

Earlier Division drafts of the offset rule continuing the current 2:1 point to nonpoint uncertainty ratio raised stakeholder concerns, and in response the staff version provided to the May 2018 Water Quality Committee included a range of ratios for public comment. As a result of that Committee meeting, staff was directed to incorporate all changes requested by the Neuse River Compliance Association in its comment letter dated May 8, 2018. As needed for this analysis, such changes will be referred to in shorthand as "NRCA-requested changes".

5.3 SUBSTANTIAL RULE CHANGES AND ACCOMPANYING ANALYSES

5.3.1 PERMANENT AND TEMPORARY CREDITS

Proposed amendments to the nutrient offset rule allow for temporary and permanent credits depending on the nature of the underlying nutrient reduction project. Land development is effectively permanent on the scales considered for nutrient offset purposes, and the riparian buffer restoration practice presently generating most offset credits is permanent in nature because it is protected by a permanent conservation easement. However, the current nutrient offset rule only provides credit for 30 years. Permanent credits are likely to provide additional value for local governments implementing existing development rules and for wastewater facilities, which can use them for offset purposes in year 31 and beyond instead of seeking new sources of credit.

The financial benefits of this change are potentially most pronounced for NPDES permittees. The effects of this change are described in the preceding chapter as part of the Neuse and Tar-Pamlico wastewater rule analysis. In brief, while the shift to permanent credits does provide some potential cost savings for NPDES permittees if they utilize the nutrient offset option, it does not appear to provide actual cost savings due to the existence of a less expensive option to acquire nutrient allocation.

According to proposed new development rule changes, developers will be required to secure permanent offset credits. As described above, because all recent offset projects are protected by permanent conservation easements and future projects of the same type will be eligible for permanent credit, this change will not result in any new costs or benefits to the development community.

This change to permanent credits for the development community is also consistent with the state's other stormwater rules, which govern onsite water quality considerations stemming from new development. 15A NCAC 02H .1002(49) defines "stormwater control measure" as "a *permanent* structural device." Further, NCAC 02H .1003(7), which governs all projects under North Carolina's various stormwater programs, indicates that "… "The permittee shall record deed restrictions and protective covenants prior to the issuance of a certificate of occupancy to ensure that projects will be *maintained in perpetuity*…"

While no costs will be incurred, superficial changes to the market will result from the change to permanent credits. Thirty times less credit will be required from developers, but each credit will be thirty times more expensive. The example below reflects the changes in the market for new developers.

Example: Stormwater calculations for a 1 acre project result in an offset credit need of 2 lbs. N per year.

- Present rule: 30 years of offsets are required for new development projects, so 60 (30 x 2) lbs. of N must be purchased from a nutrient offset bank. Credit costs are $10/lb., for a total offset cost of $600.
- Proposed rule: Development projects must be offset permanently. 2 lbs of N/yr are purchased from a nutrient offset bank, which are guaranteed in perpetuity though a permanent conservation easement. Credit costs are $300/lb./yr, for a total offset cost of $600.

This change is also likely to influence the type of offset projects installed in the future. For example, retrofitting of stormwater control measures (SCMs) into previously developed lands is a potential offset option. However, SCMs have a finite design life, such that the party responsible for permanent maintenance may seek appropriate compensation for accepting the liability to maintain and refurbish SCMs. Under the 30-year maintenance agreements that have been associated with the few SCM retrofit offset projects done to date, this cost would not be incurred, but the water quality benefits from the SCM would also decline after several decades while the beneficiary development is likely to remain. Ultimately, this change may further solidify the existing preference for permanently protected buffer restoration projects, which have much lower long-term maintenance costs.

Nearly all current nutrient offset activity is likely to be transacted in permanent credits upon passage of this rule. However, the offset rule also provides an option to convert between permanent and term credits in the rare event term credits may be needed. Demand for these credits would potentially come from either point sources or from local governments subject to an existing development stormwater rule. In both cases, temporary nutrient offset credits are unlikely to be the preferred option. Under existing development rules, local governments also have options not subject to the offset rule - generating their own nutrient reduction credit for direct compliance, as well as a joint compliance option. Existing point sources that might be future offset purchasers are currently operating comfortably within their nutrient caps, and acquisition of nutrient allocation from other point sources currently provides a less expensive compliance option. New and expanding point sources are likely to value permanent credits as they provide long-term security.

5.3.2 POINT TO NONPOINT SOURCE TRADING RATIO

When new wastewater treatment plants are proposed in North Carolina's nutrient strategy basins, or when existing plants seek to expand, they would be entering an impaired watershed where nutrient loads presently exceed the TMDL or TMDL alternative. To conform to federal law and policy, if additional allocation is sought via nonpoint source trading, assurance must be provided that water quality degradation is not occurring. A point to nonpoint source trading ratio is one tool available to provide this assurance.

A point to nonpoint source trading ratio is utilized to account for the relative and unavoidable uncertainty of nonpoint source nutrient reduction practices in comparison to increased nutrient loading from point sources. Examples of this relative uncertainty are provided by EPA in its 2003 Water Quality Trading Policy[66]:

- [66] EPA Water Quality Trading Policy (2003): https://www.epa.gov/sites/production/files/2016-04/documents/wqtradingtoolkit_app_b_trading_policy.pdf

> "Where trading involves nonpoint sources, states and tribes should adopt methods to account for the greater uncertainty in estimates of nonpoint source loads and reductions. Greater uncertainty in nonpoint source estimates is due to several factors including but not limited to variability in precipitation, variable performance of land management practices, time lag between implementation of some practices and full performance, and the effect of soils, cover and slope on pollutant load delivery to receiving waters."

Other factors contributing to this relative uncertainty include underlying nonpoint source practice assumptions, limited supporting scientific data, variable scientific estimates for practice performance, a bias in the scientific literature toward evaluating newly installed practices, unmonitored environmental variability, and performance variability between installations and over time due to variable local geographic conditions and maintenance practices. Ultimately, the ratio captures not just differences in load estimates, but all differences inherent in implementing nonpoint source practices as a substitute for simply monitoring point source loads.

No specific point to nonpoint source trading ratio is required by state or federal law. Yet when nutrient offset credits are used to justify additional NPDES-permitted point source discharges in impaired watersheds, federal law and guidance pertain. The Clean Water Act does not specifically authorize trading but provides for clear regulation of point sources. It also includes "anti-backsliding" and "antidegradation" provisions, which together provide federal guardrails on state authority to relax permit conditions or permit activities that result in water quality degradation. Because the Clean Water Act is silent on trading, EPA has authorized water quality trading through federal guidance, namely its 2003 Water Quality Trading Policy and its 2009 Permit Writer's Toolkit.

EPA's Water Quality Trading Policy provides several approaches that states may use to demonstrate adequate compensation for nonpoint source uncertainty, including:

> "… monitoring to verify load reductions, the use of greater than 1:1 trading ratios between nonpoint and point sources, using demonstrated performance values or conservative assumptions in estimating the effectiveness of nonpoint source management practices, using site- or trade-specific discount factors, and retiring a percentage of nonpoint source reductions for each transaction or a predetermined number of credits."

Evaluating these options in North Carolina, a default point to nonpoint source ratio is both desirable and necessary because the other listed mechanisms to address uncertainty are either inconsistently utilized or not in place. Reviewing the other criteria in turn, nutrient monitoring of nonpoint sources is not required and to do so would likely be cost prohibitive. However, a rule option is proposed to reduce the default ratio when monitoring occurs (see subparagraph (j) of this rule or Section 4.4.10 below). Uncertainty factors and conservative crediting approaches have not been consistently utilized during the credit valuation of nonpoint source practices, particularly for the market-standard agricultural buffer restoration credit. Site- or trade-specific discount factors are not presently used in North Carolina, nor are reserve or retirement ratios.

The current Neuse and Tar-Pamlico rules require a 2:1 point to nonpoint source trading ratio. However, point to nonpoint source trading ratios have been referenced or incorporated in different ways across nutrient strategies (see Table 5-1). The Division has no reason to believe nonpoint source practice uncertainty varies significantly between nutrient strategy basins. Thus, the nutrient offset rule provides a vehicle for future consistency on this point since it applies across all nutrient strategies.

TABLE 5-1 EXISTING POINT TO NONPOINT SOURCE RATIOS IN NORTH CAROLINA

Jurisdiction	NPS:PS Ratio	Reference	Excerpt
Neuse River Basin	2:1	15A NCAC 02B .0234	"If estuary allocation cannot be obtained from the existing facilities, new facilities may purchase a portion of the nonpoint source load allocation for a period of 30 years at a rate of 200 percent of the cost as set in 15A NCAC 02B .0240 to implement practices designed to offset the loading created by the new facility."
Tar-Pamlico River Basin	2.1:1	15A NCAC 02B .0229 and .0237, J.P. Tippett and R.C. Dodd, Cost Effectiveness of Agricultural BMPS for Nutrient Reduction in the Tar-Pamlico Basin, Jan. 1995.	"To estimate a single value, NCDEM multiplied the median of this range ($13/kg N) by a safety factor of 2 and then added a 10% administrative cost. The resulting figure was $28.60, which was rounded to $29/kg N" (Tippett and Dodd at 76).
Falls Lake Watershed	unspecified	15A NCAC 02B .0282	"The party seeking to sell credits shall…address the following items: (ii) Quantify and account for the relative uncertainties in reduction need estimates and load reduction estimates."
Jordan Lake Watershed	unspecified	15A NCAC 02B .0273	"The party seeking to sell credits shall… (address) the following items: (ii) Quantify and account for the relative uncertainties in reduction need estimates and excess loading reduction estimates."

As drafted by the Division, subparagraph (j)(4) provided a range of potential point to nonpoint source trading ratios, from 1.2 to 2.0, for public comment. Division staff provided this range of options based on input received during stakeholder review of initial rule drafts, to ensure public consideration and comment on a range of potential outcomes. NRCA-requested changes to the WQC subsequently resulted in a substantive change to the staff version of this provision. The WQC of the Environmental Management Commission approved a ratio of a 1.1 to 1.

As the wastewater analyses in the preceding chapter indicate, this change is not projected to result in a cost savings for wastewater treatment facilities due to the existence of less expensive compliance options. General findings remain the same across a range of scenarios. Purchasing nutrient offset credits is presently an order of magnitude more expensive than leasing nutrient allocation, even with the reduction or omission of a point-to-nonpoint source trading ratio.

Despite their lack of cost-competitiveness under current market conditions, It is possible that wastewater market participants may choose to secure nutrient offset credits for other reasons. Major changes in market dynamics cannot be entirely ruled out, particularly those extending decades into the future. Also, local governments may percieve substantial cobenefits for installing nonpoint source offset projects within their jurisdictions. To the extent this behavior occurs, a cost savings from the baseline condition would result.

The primary effect of the amended 1.1 to 1 ratio will be a reduction in confidence that nutrient loads attributable to wastewater sources will remain below their collective wasteload allocation. The amended ratio does not necessarily result in in a confirmed net increase in nutrient loading to the estuary, but future point to nonpoint source transactions will result in nutrient increases relative to the existing (baseline) rule condition. The change also potentially incurs costs associated with EPA or third-party intervention, which are unknown at this point.

EPA describes its regulatory role in its Trading Policy (at 11):

> "States and tribes are encouraged to consult with EPA throughout development of trading programs to facilitate alignment with the CWA. EPA has various oversight responsibilities under the CWA, including approval or establishment of TMDLs, approval of revisions to state or tribal water quality standards, review of NPDES permits and provisions for reviewing and making recommendations regarding revisions to a state's or tribe's water quality management plans through the continuing planning process. In general, EPA does not believe that the development and implementation by states and tribes of trading programs consistent with the provisions of this policy necessarily warrant a higher level of scrutiny under these oversight authorities than is appropriate for activities not involving trading. However, where questions or concerns arise, EPA will use its oversight authorities to ensure that trades and trading programs are fully consistent with the CWA and its implementing regulations. "

The default value in most nutrient trading programs nationwide is 2:1 or greater (see Table 5-2). According to DWR's synthesis of available guidance and precedents, any ratio below the national norm of 2:1 is likely to require a robust technical justification.

While EPA has historically refrained from establishing a minimum point to nonpoint source ratio, EPA's Chesapeake Bay Program established precedent through a 2014 technical memorandum with Bay-specific guidance that a 2:1 ratio is acceptable for Bay jurisdictions. In addition, the use of a 1.1 to 1 ratio in Pennsylvania resulted in federal intervention into the state permitting process. In response to that intervention, Pennsylvania is now utilizing a 3:1 ratio.

North Carolina's nutrient trading programs have many characteristics in common with the Bay states, most notably Virginia and Maryland. Each of these jurisdictions have revisited their trading ratios in recent years, and each has settled on a 2:1 ratio. In Virginia, a stakeholder committee was convened and a legislative study was conducted in 2014 in response to concerns that the trading ratio of 2:1 was too high. Ultimately, Virginia declined to amend its ratio and provided extensive justification for that decision.[67] Meanwhile, Maryland recently concluded an overhaul of their nutrient trading rules and they also promulgated a 2:1 default trading ratio.[68]

[67] Nutrient Credit Trading Ratio Study Report. Virginia DEQ Final Report to the State Water Control Board (2014). Accessed on August 28, 2018 at https://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/TradingRatioFinalReport12-23-2014.pdf.

[68] Code of Maryland Regulations 26.08.11.08(C)(1)(c).

TABLE 5-2 POINT TO NONPOINT SOURCE RATIOS FOR OTHER UNITED STATES JURISDICTIONS

Jurisdiction	State	NPS:PS Ratio	Reference	Excerpt
Chesapeake Bay Program	NY, DE, PA, WV, VA, MD	2:1	Accounting for Uncertainty in Offset and Trading Programs, EPA Technical Memorandum, Feb. 12 2014	"When an offset or trading transaction is conducted between a credit-generating nonpoint source and a credit-purchasing point source, EPA expects an uncertainty ratio of at least 2:1 to be used (e.g., 2 pounds of nitrogen reduction is equivalent to 1 pound of nitrogen pollution reduction credit), unless otherwise justified as explained in this technical memorandum."
Bear Creek	CO	2:1	Code of Colorado Regulations	"The trade ratio between nonpoint source and point source is set at 2:1."
Chatfield Watershed Authority	CO	2:1	Water Quality Trading Guidelines (2007)	"Pursuant to Section 73.3(2)(e) of the Control Regulation, the Trade Ratio will be 2:1 for all Trade Projects unless the applicant requests an exemption of the 2:1 trade ratio based on adequate water quality data collected on a project-specific basis."
Delaware Inland Bays	DE	2:1	Delaware Administrative Code	"Trades must involve a trading ratio of at least 2:1 between nonpoint sources and point sources."
Florida	FL	2:1, 3:1	Florida Administrative Code	"For proposed trades involving estimated credits, the Department shall use default UF ratios of 2:1 for urban stormwater (if 2 pounds or kilograms of removal are estimated, 1 pound of credit will be created) and 3:1 for agricultural runoff…"
Maryland	MD	2:1	Code of Maryland Regulations	"An uncertainty ratio of 2:1 shall be applied to trades involving credits generated by nonpoint sources and acquired by wastewater point sources, unless the generator, seller, or buyer of the credit is able to demonstrate to the Department that the lower ratio is justified and protective of water quality standards."
Rahr Malting Co., Princeton WWTF	MN	2.6:1	State of Minnesota Website	n/a
New York City	NY	3:1	New York City Rules and Regulations	"…the Department may require that each one (1) kilogram of projected increase in the phosphorus load resulting from the proposed new wastewater treatment plant, together with any accompanying nonpoint source runoff, is actually offset by at least three (3) kilograms of reductions in phosphorus loading within the basin within which the proposed project is located…"
Ohio	OH	2:1, 3:1	Ohio Administrative Code	"(B) For water quality trading activities between a permittee and a nonpoint source, the water quality credit shall satisfy either of the following: … (1) When there is not an approved TMDL, be calculated using a trading ratio where two pounds of pollutant reduction equals one pound of water quality credit for that pollutant. (2) When there is an approved TMDL, be calculated using a trading ratio where three pounds of pollutant reduction equals one pound of water quality credit for that pollutant."

Jurisdiction	State	NPS:PS Ratio	Reference	Excerpt
Pennsylvania	PA	3:1	Pennsylvania Phase II WIP Nutrient Trading Supplement	"As a result of EPA's concerns and objections to NPDES permits related to the baseline and threshold eligibility requirements for the generation of credits by agricultural operations, DEP has not approved any requests for credit certification for nonpoint sources since October 1, 2013. To address EPA's concern and ensure consistency with the Chesapeake Bay TMDL, DEP is implementing a 3:1 trading ratio as an interim step until DEP can develop a performance-based or other approved method-based tool to use to establish baseline eligibility for nonpoint sources."
Virginia	VA	2:1	Nutrient Credit Trading Ratio Study Report Virginia DEQ Final Report to the State Water Control Board (2014)	"Based on the research done for this report, discussion with stakeholders and the February 12, 2014 EPA Technical Memorandum, DEQ recommends that there should be no separate rulemaking at this time to address the current 2 to 1 trading ratio."
Fox River	WI	2:1	Fox River Phosphorus Trading Program Website	"For every pound of credits traded, credit generators must reduce by at least two pounds the amount phosphorus discharged to waterways. "
ACWA Trading Toolkit (national guidance)	USA	2:1	ACWA Website	n/a. See page 91 for example utilizing 2:1 uncertainty ratio.
EPA Trading Toolkit (national guidance)	USA	2:1	EPA Website	n/a. See Point Source-Nonpoint Source Trading Chapter at 13, 2:1 used as example uncertainty ratio

Substantial expenditures could be incurred by DWR, wastewater permittees, and the general public should federal intervention, litigation, or renewed rulemaking become necessary to address trading ratio issues. However, any post-rulemaking action from EPA or resulting from a citizen suit would have to be discounted in accordance with its likelihood. In some respects the application of trading ratios is a matter of regulatory discretion, and therefore the likelihood of future federal intervention is subject to change depending on the regulatory perspectives of current and future administrations. Further, since the utilization of nonpoint source credit is a rare and relatively cost-ineffective occurrence, a discount rate associated with intervention during these events would also be difficult to determine.

Reductions in the nutrient trading ratio may also affect credit providers, though this trend is difficult to reliably forecast. A reduced trading ratio may make credits more cost-competitive with other compliance options, potentially bolstering demand for providers' services. However, a reduction in the ratio also reduces the total number of credits required by wastewater sources, which in turn could reduce total demand.

5.3.3 STREAM AND NUTRIENT CREDIT STACKING

Two rule options have been provided for public comment regarding whether stream and nutrient credit stacking should be allowable. **Credit stacking** refers the generation of multiple types of environmental credits within the same footprint. Stacking can be appropriate in some circumstances, but in others unintended net environmental impacts may occur from "double dipping" (defined below). Though the nutrient offset rule is presently silent on this topic, stream and nutrient credit stacking is presently allowed by the Division.

To assist with the evaluation of this issue, a necessarily abbreviated overview of stream mitigation, buffer mitigation, and nutrient offset programs are provided below.

> *Stream mitigation.* Stream impacts are quantified in terms of linear feet, and stream impacts over a minimum threshold (300 ft. state, 150 ft. federal) must be mitigated. The character of the riparian area being impacted is not a factor in calculating stream mitigation requirements. The archetypical stream mitigation project results in the restoration of an equal amount of stream length but also a 50 ft. wooded buffer on each side. Thus, the restoration of riparian buffers is an inherent and required aspect of stream mitigation.
>
> *Buffer mitigation.* Buffer mitigation is required by state rules for some buffer impacts occurring within a 50-foot natural riparian zone. Subject to various ratios, buffer mitigation projects generally restore an equal or greater amount of wooded buffer area where it did not previously exist.
>
> *Nutrient offsets.* Nutrient reduction requirements are in place for new development projects and wastewater dischargers. Upon satisfying certain conditions, regulated parties may obtain nutrient offset credits generated from nutrient offset banks. These banks usually employ the same nutrient reduction practice that also results in buffer credits: agricultural buffer restoration.

The evaluation of whether stacking is appropriate depends on the relationship between environmental impacts and mitigation or offsetting benefits in various trading and mitigation programs. Wetland, stream, and buffer credits all represent **bundled credits**, which generally account for all of the services provided by a particular ecosystem. For example, wetlands can provide habitat for fish, shellfish, migratory birds and endangered species; flood protection; erosion control; and water quality benefits including but by no means limited to nitrogen and phosphorus attenuation. As wetlands are damaged through development, they are replaced elsewhere through mitigation which seeks to restore these functions in whole. Importantly, development project impacts to wetlands, buffers, and streams within nutrient strategy watersheds would likely result in additional nutrient loading if not for mitigation requirements designed to restore an area equal to or greater than the area impacted.

On the other hand, nutrient offset credits represent an **unbundled credit**, where only one among many ecosystem services is being accounted for. All nutrient reduction practices generate nutrient reduction credit, but many also have additional benefits that are not accounted for. So long as the various unbundled credits resulting from a nutrient reduction project are discrete, they may be stacked and sold separately to offset distinct impacts without "**double dipping"**. "Double dipping" generally refers to a situation in which credit stacking results in a loss environmental function because mitigation or offsetting actions insufficiently replace regulated impacts.

An evaluation of double dipping can be done by comparing the net effect of impacts and benefits for various mitigation and stacking scenarios. To determine whether nutrient offset credits may be appropriately stacked with stream credits, we first evaluate various stream mitigation scenarios. Where net buffer improvements occur, it may possible to provide additional buffer or nutrient credit without double counting.

To illustrate various stream mitigation scenarios, we use the framework proposed by Cooley and Olander (2011).[69] These scenarios can have net positive, negative, or neutral impacts and can be represented by this general equation:

[environmental mitigation/offset credit] – [environmental impact] = [net environmental result]

As a general rule (with exceptions and variations), 1 linear foot of stream credit encompasses 1 linear foot of stream and 100 square feet of buffer, 50 square feet on each side of the stream. Under the current regulatory structure, in scenarios where only stream mitigation is required a net buffer benefit accrues.

- *Scenario 1: 500 linear feet of stream of stream are impacted and federal stream mitigation is required, but no forested buffers are impacted. This might result from a road impact to a stream bordered by farm fields.*

  [Instream restoration (500 linear feet) + buffer restoration (50,000 sq. ft.)] – [instream impact (500 linear feet)] = 50,000 sq. ft. buffer restoration benefit.

If a project impacts both forested riparian buffers and a stream, and if thresholds for federal stream mitigation and state buffer mitigation are exceeded, the stream/buffer stacking approach results in no net benefits or impacts.

- *Scenario 2: 500 linear feet of stream are impacted and federal stream mitigation is required and 50,000 sq. ft. of forested buffers are impacted and so state buffer mitigation is also required. This might result from a road impacting a stream bordered by forest land.*

  [Instream restoration (500 lf) + stacked buffer restoration for stream and buffer credit (50,000 sq. ft.) – [instream impact (500 lf) + buffer impact (50,000 sq. ft.)] = 0.

However, without stream/buffer credit stacking a net buffer benefit would again accrue. However, this net environmental benefit would also entail additional mitigation project costs, which are ultimately passed along to developers.

[Instream restoration (500 lf) + buffer restoration for stream credit (50,000 sq. ft.) + buffer restoration for buffer credit (50,000 sq. ft.] – [instream impact (500 lf) + buffer impact (50,000 sq. ft.)] = 50,000 sq. ft. buffer restoration benefit.

These scenarios show that where stream mitigation is required, an additional buffer benefit is often realized, and this benefit is potentially creditable in our North Carolina's buffer mitigation program without double dipping. Because these buffers have nutrient benefits that are quantifiable, they might also be converted to nutrient offset credits.

[69] David Cooley and Lydia Olander. Stacking Ecosystem Services Payments: Risks and Solutions. Nicholas Institute Working Paper (2011). Accessed August 28, 2018 at https://nicholasinstitute.duke.edu/sites/default/files/publications/stacking-ecosystem-services-payments-paper.pdf.

However, in other situations stream and buffer impacts can occur without mitigation requirements, providing a net loss in ecosystem functions.

- *Scenario 3: 100 linear feet of stream impacts not requiring stream mitigation and no forested buffers are impacted. This might result from a road impacting a stream bordered by farm fields.*
  [no stream credit] – [instream impact (100 lf)] = 100 linear feet of stream impact (and potential associated nutrient increases).

- *Scenario 4: 100 linear feet of stream impacts not requiring stream mitigation and 10,000 sq. ft. of forested buffers impacted, also not requiring state buffer mitigation. This might result from a road impacting a stream bordered by forest land.*
  [no stream credit] – [instream impact (100 lf) + buffer impact (10,000 sq. ft.)] = 100 linear feet of stream impact and 10,000 square feet of buffer impact (including associated nutrient increases)

These scenarios illustrate two key facts regarding stream and nutrient credit stacking. First, where stream mitigation is required, stacking stream and nutrient credits does not inherently result in double-dipping and a net increase in nutrient loading. Because double-dippinging is typically the most concerning aspect of credit stacking, it follows that stream and nutrient credits might reasonably be stacked.

Second, the design of the stream and buffer rules do allow unmitigated impacts to occur, which may result in cumulatively significant net impacts at the watershed scale, including increases in nutrient loading. Given the varying results of alternative stream impact and mitigation scenarios, any net benefits that arise from projects requiring mitigation might be fairly attributed to offsetting impacts from projects that don't require mitigation. Under this line of thought, stacking nutrient and stream credits might then be prohibited to protect against net environmental degradation resulting from below-threshold environmental projects.

A list of active private nutrient offset banks that can could potentially sell stacked stream and nutrient credits is provided in Table 5-3. This table represents an estimate of the total maximum amount of nutrient offset credit available to these providers if all areas within 50 feet of the stream were utilized for nutrient offset credit at a rate of 2,273 lbs. N/acre and 146.4 lbs. P/acre. With exceptions, it is customary practice for private providers to initially accept credit releases for stream and buffer credit, then convert buffer credit to nutrient credit as desired.

TABLE 5-3 NUTRIENT OFFSET BANKS WITH POTENTIALLY STACKABLE STREAM AND NUTRIENT CREDIT

Site Name	Basin/WS	Status	Stackable Acreage	Potentially Stacked N Credits (lbs.)	Released Potentially Stacked N Credits (lbs.)	Actually Converted N Credits (lbs.)	Potentially Stacked P Credits (lbs.)	Released Potentially Stacked P Credits (lbs.)	Actually Converted P Credits (lbs.)
Bass Mountain	Haw	Active	6.13	9,789.89	8,810.9	3,353.80	590.64	531.58	202.34
Buffalo Branch	Neuse 01	Active	7.7	17,502.25	12,251.58	0	n/a	n/a	n/a
Falling Creek	Neuse 01	Active	10.97	24,935.03	11,220.76	11,220.76	n/a	n/a	n/a
Grantham Branch	Neuse 01	Active	6.55	14,888.28	6,999.73	0	n/a	n/a	n/a
Pancho	Neuse 01	Active	5.02	11,410.56	10,269.50	2,273.02	n/a	n/a	n/a
Selma Mill	Neuse 01	Active	13.54	30,776.69	13,849.51	0	n/a	n/a	n/a
Cedar Grove	Falls	Active	14.71	33,436.12	28,420.7	0	2,153.54	1,830.51	0
Tar River Headwaters	Tar-Pamlico	Active	8.13	18,479.65	12,011.77	6,182.62	1,190.23	773.65	398.19
	Totals		72.75	161,218	103,834	23,030	3,934	3,136	601

A summary of stacked buffer-to-nutrient credit conversion activity is provided in Table 5-4. In total, approximately 20% of stacked credits are used for nutrient offsets while the remaining 80% are used for buffer mitigation. However, this figure varies by service area, from 51% in the Tar-Pamlico basin to 0% in the Falls Lake watershed.

TABLE 5-4 STACKED BUFFER-TO-NUTRIENT CREDIT CONVERSION ACTIVITY BY SERVICE AREA

Service Area	Number of Active Banks with Stackable Credits	Stackable Acreage	Released Potentially Stacked N Credits (lbs.)	Actually Converted N Credits (lbs.)	% N Credits Converted	Released Potentially Stacked P Credits (lbs.)	Actually Converted P Credits (lbs.)	% P Credits Converted
Haw	1	6.13	8,810.90	3,353.80	38%	531.58	202.34	38%
Neuse 01	5	43.78	54,591.08	13,493.78	25%	n/a	n/a	n/a
Falls	1	14.71	28,420.70	0.00	0%	1,830.51	0.00	0%
Tar-Pamlico	1	8.13	12,011.77	6,182.62	51%	773.65	398.19	51%
Total	8	72.75	103,834.45	23,030.20	22%	3,135.74	600.53	19%

In addition to the banks above, nine additional banks have recently been approved with potentially stackable credits. However, no credit releases (and therefore no credit conversions) have occurred. Six are in the Haw watershed (23.81 stackable acres) where new development nutrient offsets are not presently required, and three are in the Neuse 01 basin (9.12 stackable acres).

Based on information available to the Division and after evaluating market trends, it is difficult to predict any substantial market changes resulting at a watershed scale from a prohibition on nutrient/stream credit stacking. The decision to allow or prohibit nutrient/stream stacking does not affect the total amount of buffer restoration required to supply nutrient offsets and buffer mitigation in nutrient strategy basins, nor does it necessitate an increase in costs. Stream/buffer stacking will continue to be allowable and providers will still be able to realize full value for their stacked buffer credits for use in mitigating buffer impacts. It also follows that the decision to allow or prohibit nutrient/stream stacking is unlikely to have significant environmental benefits or costs in relation to the current regulatory environment.

Some costs may be incurred if providers take longer to sell buffer credits due to an inability to convert them. However, in the current market, only a small proportion of buffer credits are generated on stream restoration sites within 50 feet of the stream. Of that small amount, only 20% have been converted into nutrient offset credits in recent years. However, 80% of the time stacked buffer credits are not converted to nutrient credit, indicating that buffer credits are usually the more attractive commodity even when stream/nutrient stacking is allowed.

The extent to which private providers will adjust pricing strategies or mitigation site selection in response to a change in stacking policy is unknown but potentially significant. Because private providers also supply DMS with credits, any changes may also eventually be reflected in public DMS rates.

Based on this analysis, a reasonable decision could be made to allow or prohibit stacking of nutrient and stream credits. Potential considerations weighing for and against a change in policy are provided here, with expectations that the public comment period will provide further insights or critiques.

One consideration is the relative performance requirements for a federal stream mitigation credit versus state buffer mitigation or nutrient offset credits. Generally, the vegetation performance standards associated with stream mitigation are higher than those associated with buffer and offset credit requirements alone (see Table 5-5). Therefore, by allowing stacking in both the environmental impact and mitigation requirements, somewhat higher quality buffer restoration may be expected for state buffer mitigation purposes, and that benefit may extend to nutrient reduction performance as well. This also correlates with DWR staff's general perspective that combined mitigation projects (of all types) are often of higher quality than projects seeking to address only one type of mitigation or offset.

TABLE 5-5 VEGETATION PERFORMANCE STANDARDS: STREAM MITIGATION VS. NUTRIENT OFFSET CREDITS

Vegetation	Performance Standards for Stem Density	Performance Standards for Vegetation Heights	Monitoring Plot Expectation	Annual Monitoring Plot Data	Key purposes of vegetation required for mitigation
For Stream sites	320 stems/acre at year 3; 260 stems/acre at year 5; and 210 stems/acre at year 7	average 7' at year 5; and average 10' at year 7	permanent and rotating combined	7 years	wildlife corridor, sediment control, runoff control, stream shading, bank stability, nutrient load reductions
For Nutrient Offset sites	260 stems/acre	none specified	permanent	5 years	nutrient load reductions from adjacent runoff by slowing velocity of overland flow, capture sediment, increase absorption rates of runoff in the soil

Consistency among mitigation and offset rules is another consideration. Because the underlying nutrient reduction practice is similar, allowing stream/nutrient stacking is generally consistent with a prior decision by the N.C. Interagency Review Team that stream and buffer credits may be stacked, and it is also generally consistent with the consolidated buffer mitigation rule. This consistency may result in a more streamlined regulatory environment, reducing costs for mitigation providers and DWR.

On the other hand, the nature of nutrient offset impacts (upland development) is different in many respects and perhaps justifies different treatment. Most buffer impacts result from road development where riparian buffers and streams are concurrently impacted. These closely intertwined impacts provide an implicit justification for stream and buffer credit stacking and allow mitigation projects to more closely mirror impacts. In contrast, upland development generally happens outside of the stream/buffer corridor, and so the physical connection between project impacts and stacked credits is more attenuated.

Finally, from a comparative policy perspective, North Carolina's model differs from Virginia. Virginia does not allow stream and nutrient stacking although their state has similar offset and mitigation programs (See Va. Code §62.1-44.19:20(B)(1)(c)).

5.4 OTHER RULE CHANGES

The remaining changes to the nutrient offset rule are described below, organized by paragraph.

5.4.1 REVISIONS IN PARAGRAPH (A), PURPOSE STATEMENT

The existing rule describes it purpose "to establish procedures for the optional payment of nutrient offset fees." As drafted by staff, the purpose was intended to more accurately summarize the rule's collective provisions as "to establish standards and procedures applicable to providers for approval of nutrient reduction projects and associated nutrient offset credits..." Additional language sought to clarify that nutrient offset credits are not needed for direct compliance or joint compliance with individual nutrient strategy rules, including existing development rules. However, they may be used to support individual or joint compliance.

NRCA-requested changes define the term “nutrient accounting” to include “joint compliance by multiple local governments.” While it is unclear what other arrangements might be included or excluded from that term, it is not used elsewhere and therefore significant regulatory impacts are not expected.

NRCA-requested changes also omit a phrase (“or utilized by”) that could in turn omit entities that generate and utilize their own nutrient offset credits from the application of this rule. This change contrasts with inclusion of paragraphs (k) and (l), which are specifically designed to ensure permittees can implement their own nutrient offset projects. Therefore, this rule change introduces tension within the rule. Depending on the ultimate interpretation, this change could be neglible (a broad purpose statement ignored in favor or more specific provisions) or very significant (barring developers and NPDES-permittees from installing their own nutrient offset projects). Even in this worst case scenario, the Division estimates that the market will provide more cost-effective nutrient offset options due to the expertise of professional providers and their access to more cost-effective nutrient offset projects.

5.4.2 REVISIONS IN PARAGRAPH (B), GEOGRAPHIC RESTRICTIONS

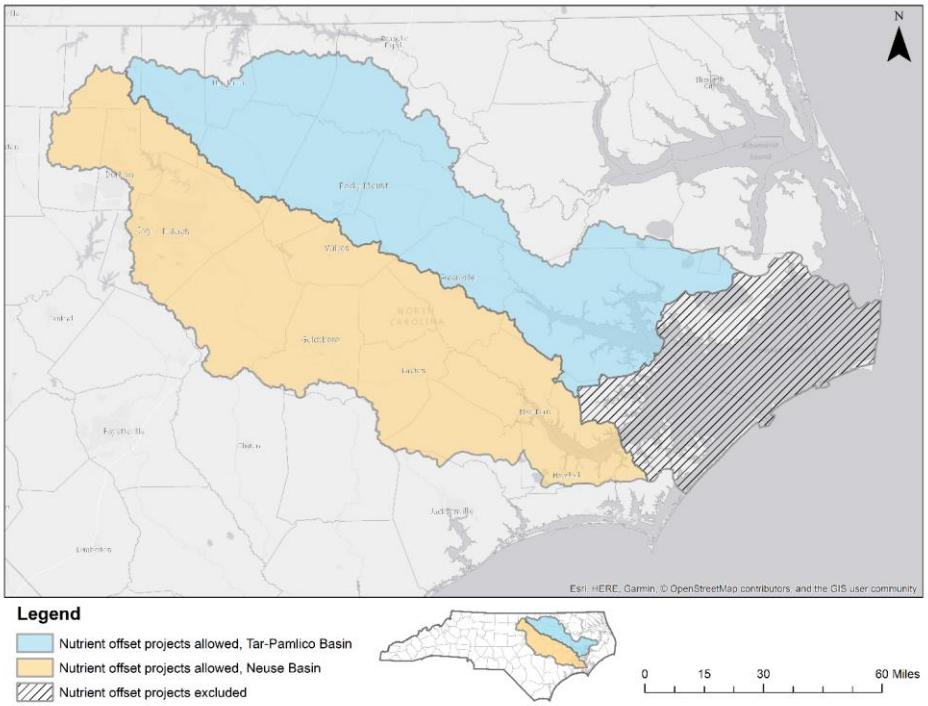
Geographic restrictions regarding the transfer of nutrient offset credit are contained in legislation (G.S. 143-214.26) and in the nutrient offset rule. Nutrient offset trades are limited to within the same 8-digit hydrologic unit unless otherwise specified, and trades in the Jordan and Falls Lake strategies are both restricted to smaller areas due to the distinct regulatory treatment of smaller areas. These provisions have been amended for clarity with no change in effect.

In response to stakeholder inquiries, the Division also offered a new amendment that would explicitly allow for the installation of in-water offset projects so long as they were installed upstream of a presently or historically nutrient-impaired estuarine segment. This provision was originally inserted to enable oyster or SAV restoration projects if a credit can be established, and such work is underway in other jurisdictions. Failure to include this provision would potentially open most of Pamlico Sound to generating offset credit, where it would be unlikely to significantly influence nutrient-impaired segments.

NRCA-requested changes deleted the term “in-water” from this proposed language, so the restriction as drafted also applies to land-based nutrient offset projects if they do not drain to an impaired estuarine segment. Therefore, some coastal areas of the Tar-Pamlico and Neuse basins would become ineligible to host nutrient offset banks. Nevertheless, given the lack of credit demand, lack of nutrient offset banks, and highly agricultural nature of these coastal areas, such a change is unlikely to influence the availability of nutrient offset projects or the market price of credits, and such change may also provide small relative benefits to estuarine water quality. Therefore, an expansion of this language from “in-water” to effectively all projects remains consistent with strategy purposes.

The Division interprets the phrase “an assessment unit identified for restoration…” in (b)(5)(A) to include estuarine segments that were modeled during the establishment of a TMDL to assess their response to nutrient reductions. These estuarine modeling efforts and their respective boundaries are referenced within the Neuse and Tar-Pamlico TMDL documents, and a map is provided below for general reference.

FIGURE 5-1 ALLOWABLE AREA (APPROXIMATE) FOR NUTRIENT OFFSET PROJECTS IN THE NEUSE AND TAR-PAMLICO BASINS BASED ON PROPOSED RULE LANGUAGE.



5.4.3 REVISIONS IN PARAGRAPH (C), NUTRIENT OFFSET CREDIT APPROVAL STANDARD

A general nutrient offset credit approval standard was added to the rule. In concert with more specific conditions contained in subsequent paragraphs, this general standard provides the benchmark by which nutrient offset projects can be assessed and their credits utilized for regulatory purposes. No costs are associated with the inclusion of this language.

5.4.4 REVISIONS IN PARAGRAPH (D), QUANTIFYING NUTRIENT OFFSET CREDITS

Paragraph (d) contains several substantial changes that were evaluated above, including stream/nutrient credit stacking and temporary/permanent credits. The remaining change worthy of discussion relates to the baseline condition against which nutrient offset credit is established.

Federal trading policy and general logic requires the establishment of a baseline condition against which nutrient reductions are measured. Establishment of a regulatory baseline is also consistent with broader nutrient strategy nutrient reduction goals and diminishes incentives for parties to purposefully degrade existing land conditions to generate greater relative nutrient reductions and associated revenues. To the extent the baseline issue arises presently, it is addressed as a matter of agency discretion. Depending on the history and use of the project site,

the baseline condition could be set from the date of a nutrient strategy baseline, from current conditions, or from conditions resulting during an intervening period.

In areas that have already been developed according to state and local stormwater rules, the existing nutrient loading condition of the project area can be used as the baseline condition for calculating nutrient reduction credit. This language is intended to provide clarity and consistency and does not result in new costs.

In agricultural or nondeveloped areas, failure to include appropriate baseline conditions potentially incentivizes landowners to degrade existing nutrient reduction functions to realize higher levels of nutrient reduction credit. Based on current crediting protocols, this is particularly a concern in areas that are not protected by buffer rules but are eligible for nutrient reduction credit (50-200 feet from the stream bed). One potentially concerning example might entail the clearing of forested land in these areas with a nominal, low cost attempt to convert the land to an agriculural state (hay production, for example). Without an appropriate baseline determination, a landowner or bank might engage in such activities solely in an attempt to maximize nutrient reductions from the project site. In this scenario, nutrient reduction credits may be rewarded and sold to offset other impacts while the project site hosting the nutrient offset bank is in equal or worse nutrient loading condition compared to the strategy baseline.

Despite the concerns above, over time it can become difficult to ascertain the condition of land during the strategy baseline period. This is particularly true for the Neuse and Tar-Pamlico strategies, for which baseline periods are now decades old and for which aerial imagery is difficult if not impossible to acquire. To balance these concerns, DWR proposed allowing current site conditions to be used if it was actively deforested for 10 years and the party seeking credit was not responsible for the deforestation.

Importantly, the baseline conditions proposed by the Division do not restrict landowners from utilizing their land in any way they see fit. However, it does remove a financial incentive to actively degrading their properties for the purpose of generating offset credits.

NRCA requested the removal the agriculture and forestry-related baseline conditions. Therefore, the baseline for properties in this condition will continue to be addressed on a discretionary basis by the Division. Ultimately, these provisions are intended to provide clarity to the regulated community but result in no changes from current regulatory conditions.

5.4.5 REVISIONS IN PARAGRAPH (E), PROJECT APPROVAL STANDARDS

Paragraphs (e) through (h) reflect a reorganization of the present rule intended to reflect the chronological nature of the credit generation process. Paragraph (e) in particular provides a checklist of items that must be addressed before a project can generate nutrient offset credit, and it also obligates the Division to approve proposed projects once all criteria have been met. Many of these provisions are contained in the current rule, while others are key provisions that are typically included in existing banking instruments or project plans. These changes are designed to codify major policy requirements in rule while also providing clear direction for providers. As is current practice, this paragraph requires a preliminary site visit, financial assurances, and an approved banking instrument and project plan before the project can generate nutrient offset credits.

An NRCA-requested change removed an option for NPDES-permittees to provide financial assurances via their existing tax or rate authority. Such removal potentially increases financial assurance costs for these entities in comparison with prior rule drafts, but it does not increase costs relative to the current rule.

5.4.6 REVISIONS IN PARAGRAPH (F), RELEASE AND ACCOUNTING FOR NUTRIENT OFFSET CREDITS

Nutrient offset credits are released by the Division to a provider upon the completion of project milestones. Specific milestones are contained in banking instruments and that practice will continue. However, consistent with current practice, these provisions provide general limitations regarding the release of nutrient offset credits until key aspects of the project are completed. These limitations, in association with related financial assurances, are intended to ensure that nutrient reduction projects are completed as described in the project plan.

Also, this paragraph prevents state and federal grant funds from being used to generate permanent nutrient offset credits or subsidize the nutrient offset market. This provision ensures funds intended for net environmental improvement cannot be used to offset environmental impacts while the provider is compensated twice. Staff research to date indicates that state and federal grant sources have diverging rules and policies on this topic, and that a proactive approach can avoid controversy related to "double dipping." This provision does not address the use of state and federal grant funds for direct rule compliance purposes, nor does it prevent local government funds from being used to generate offset credits.

No new costs are projected from the inclusion of these provisions because they are consistent with current practice.

5.4.7 REVISIONS IN PARAGRAPH (G), MAINTAINING PERMENENT NUTRIENT OFFSET CREDITS

This paragraph details the conditions that must be met to maintain permanent nutrient offset credits. These provisions are consistent with the current rule or with banking instruments and conservation easements typically associated with existing offset banks.

There is a small degree of risk that landowners and/or permanent stewards may fail to meet long term land management requirements needed to maintain nutrient reductions. In this circumstance, this paragraph includes a provision that allows the Division to invalidate credits if other enforcement efforts are not successful.

The final provision of this paragraph addresses the potential impacts of natural disasters, most likely hurricanes or fire. Presently, most nutrient offset projects use the agricultural buffer restoration practice, which is designed to restore a natural ecological community. The project duration is 5-7 years, during which the most critical phase of restoration occurs. If the site is impacted during that project period, providers will be required to restore the site. Beyond that period, the foliage at the site is expected to become more resilient as the plantings mature. Because large scale disturbance events are part of the natural ecological condition, and because ecological succession can be relied upon to restore the site without the need for dedicated new plantings, the Division will not require further restoration by the landowner or steward after project completion. Inclusion of this provision reduces risk for the landowner and long-term steward and therefore reduces the amount for funding necessary for a non-wasting endowment by the provider. To date, this has been a largely theoretical issue and no formal policy is in place to address it. Therefore, it establishes the benchmark in these situations and results in neither a cost nor a benefit.

5.4.8 REVISIONS IN PARAGRAPH (H), RENEWING TERM NUTRIENT OFFSET CREDITS

Presently, there is little need to renew temporary offset credits because most credits are sold for new development use and then retired. However, in the future local governments and NPDES-permittees may have a greater need for credits, which might be supported by more short-term practices. Once a practice is established and credits assigned for a specified duration, credits can be renewed simply by documenting its current

functioning with the Division in relation to the general crediting standard. The rule establishes a benchmark in these situations and results in a neither a cost nor a benefit. However, it does add regulatory flexibility to address offset credit needs through a combination of permanent credits and short-term renewable practices.

5.4.9 REVISIONS IN PARAGRAPH (I), ADDITIONAL PROVISIONS REGARDING THE DIVISION OF MITIGATION SERVICES.

The Division of Mitigation Services is a state program and the only authorized nutrient in-lieu fee program for North Carolina's nutrient strategies. This rule expands upon prior provisions governing DMS, primarily by utilizing current DMS products to improve transparency regarding its nutrient crediting program.

Subparagraph (2) newly requires that DMS provides ledgers to the Division as part of an annual report. While the requirement is new, DMS has provided annual reports for many years which contains much of the requested information, and DMS staff also provides ledgers upon request to the Division and other parties.

Subparagraphs (3) and (4) establish a general expectation that DMS will construct nutrient offset projects by the end of the third state fiscal year after which payment is received. If that expectation is not met, DMS will publish an action strategy address the reasons for the delay and its plans to install any necessary projects. Neglible costs are expected as a result of this reporting requirment, as DMS presently seeks to document and address situations in which credit requirements substantially exceed credits generated as an integral part of its overall mission.

5.4.10 REVISIONS IN PARAGRAPH (J), NUTRIENT OFFSET CREDIT TRANSACTIONS

Two provisions in paragraph (j) potentially have significant fiscal implications. Subparagraph (4) governs the point to nonpoint source trading ratio, which was evaluated above. Subparagraph(4) also governs the monitoring conditions by which the point to nonpoint source trading ratio may be reduced, and is addressed briefly here. Subparagraph (6) provides new guidance for term credits.

The staff-drafted version of subparagraph (4) contained a provision allowing for the point-to-nonpoint source trading ratio to be reduced if water-quality monitoring consistent with Division standards is utilized for nonpoint source nutrient reduction practices. NRCA-requested changes resulted in language that allows the point to nonpoint source ratio to be eliminated for "monitored nonpoint source reductions." By not specifying *water quality* monitoring or establishing standards for such monitoring, a de facto elimination of the trading ratio would result, as the Division requires "monitoring" for nutrient offset projects elsewhere in the current and proposed rule [see (e)(2)(I)], and such monitoring involves a visual inspection of the project but does not include water quality measurements.

While the Division is conceptually amenable to reducing the point to nonpoint source trading ratio when water quality monitoring is employed, this option is not likely to result in additional cost savings for point sources. Monitoring the nutrient reductions attributable to agricultural buffer restoration is an expensive, multi-year research endeavor to date conducted largely by academic interests. Estimating nutrient reductions attributable to stormwater control measures is also largely in the academic realm and requires automated volume, influent and effluent monitoring throughout the course of multiple storm events annually, sample analysis by qualified labs and development of statistics, all pursuant to established quality assurance protocols. Sustaining this level of monitoring indefinitely at scales relevant to offset new point sources is likely to be cost prohibitive, and it is the primary reason the Division establishes reduction estimates for various practices in accordance with applicable research studies.

Also, as described in the preceding chapter, nutrient offsets are presently a less cost-effective option than the acquisition of allocation. Even an elimination of the point to nonpoint source ratio is unlikely to result in a cost savings.

Subparagraph (6) requires term credits to be associated with the year in which they are projected to be generated. This requirement is intended to preclude a situation in which nutrient reductions are mismatched in time with the loads they seek to offset. This requirement will not affect the new development market, which will utilize permanent credits in the future. It also will not necessarily affect the predominant nutrient reduction practice of agriculture buffer restoration, which will be entitled to permanent credit because it is protected by a permanent conservation easement. Finally, it will not affect credits generated pursuant to the Phase IV Tar-Pamlico agreement because they are not generated by nor subject to the offset rule.

5.4.11 REVISIONS IN PARAGRAPH (K), DEVELOPER-RESPONSIBLE NUTRIENT OFFSET PROJECTS

Paragraph (k) clarifies that developers can also establish nutrient offset banks and and provides two different regulatory paths to achieve that objective. If developers wish to generate their own credits away from the project site, they may establish a nutrient offset bank in the same manner as any other private provider. However, credits accrued in this manner typically take 5-7 years to mature, and developers cannot obtain an occupancy permit from their local government authority until they have acquired all necessary offsets. The alternate option allows developers to earn all offset credit immediately upon construction of the nutrient reduction practice. In return for that flexibility, the option requires twice the amount of nutrient reductions to be obtained, resulting in additional water quality benefits.

Apart from this provision, developers also retain the option to generate nutrient reductions onsite, purchase nutrient offset credits from a provider, or utilize the state's in-lieu fee program. This provision provides additional pathways for compliance while remaining protective of water quality and no additional costs are projected from its implementation. The provision is not likely to be utilized regularly but may be beneficial for developers with significant riparian land holdings.

5.4.12 REVISIONS IN PARAGRAPH (L), NPDES WASTEWATER PERMITTEE-RESPONSIBLE NUTRIENT OFFSET PROJECTS

Paragraph (l) clarifies that NPDES wastewater permittees can establish nutrient offset banks to address nutrient permit requirements. This vertically-integrated approach to nutrient trading is consistent with nutrient trading models nationally. Further, it potentially provides opportunities for municipal NPDES wastewater permittees to generate nonpoint source credits using methods that are not traditionally utilized by private providers, such as installation of nutrient reduction practices on public land or in urban areas. It is not clear that such projects would result in more cost-effective nutrient credits than those purchased from private providers, but such projects may have valuable co-benefits. As with the preceding paragraph, this provision provides additional pathways for compliance while remaining protective of water quality and no additional costs are projected from its implementation.

The practical utility of this provision for NPDES permittees is uncertain. Some NPDES permittees have indicated interest in this trading option, but fiscal analyses in the prior chapter indicate it is not their most cost-effective approach for securing new nutrient allocation. If utilized, the scale of nutrient reduction needs from wastewater treatment plants can be quite large in comparison to the new development market.

CHAPTER 6 NEW DEVELOPMENT STORMWATER RULES

6.1 INTRODUCTION: NEUSE AND TAR-PAMLICO NEW DEVELOPMENT STORMWATER RULES

These two rules were enacted in 1998 and 2001 respectively and used the same basic regulatory approach. Local governments identified by name in these rules are required to develop and implement stormwater permitting programs that require developers to implement stormwater controls to meet nutrient loading rate targets on new development projects. Developers are required to control nutrient export to certain levels onsite using engineered Stormwater Control Measures (SCMS), and may meet remaining reduction needs through offsite measures, including nutrient offset payments to the North Carolina Division of Mitigation Services (NC DMS), to private banks, or to local governments with a Division-approved offset program. The following sections detail the current and proposed Neuse requirements along with the cost analysis method and results. Subsequent sections identify differences contained in the Tar-Pamlico rule and analysis, along with cost implications.

6.2 NEUSE STORMWATER RULE REQUIREMENTS

The Neuse New Development Stormwater Rule (15A NCAC 02B .0235) sets requirements for reducing nitrogen runoff from new development projects within the planning and zoning jurisdictions of fifteen named local governments in the Neuse River Basin. Under the rule, total nitrogen (TN) export for new development projects is limited to a rate of 3.6 lbs TN/acre/yr. This loading rate target represents the nutrient strategy's overall 30% reduction goal applied to average pre-development loading conditions.

Under the rule, the nitrogen export target may be achieved entirely on site, or through a combination of site design, on-site stormwater control measures (SCMs) and nutrient offsets purchased from a Division-approved offset program. If the untreated nitrogen export for a planned project is calculated to be greater than 6.0 lbs/ac/yr for residential, or 10.0 lbs/ac/yr for commercial/industrial/multi-family development, the developer must first implement onsite SCMs to lower site export to at least those levels before being allowed to "buy down" the remainder of their export to the rule-required 3.6 lbs/ac/yr target using offsite offsets.

As of 2002, each of the fifteen local governments subject to the Neuse Stormwater Rule adopted and implemented their local permitting programs requiring new development projects to control stormwater runoff. Upon implementation, local governments were required to submit annual reports to the Division.

6.2.1 PROPOSED REVISIONS TO THE NEUSE NEW DEVELOPMENT STORMWATER RULE

The proposed revisions to the Neuse Stormwater Rule include three provisions that may result in additional costs and/or cost savings for developers. These proposed revisions are described below.

6.2.1.1 *ADDITION OF OTHER LOCAL GOVERNMENTS TO THE RULE*

Sixteen local governments are proposed to be added to the fifteen currently subject to the rule (Table 6-1). This would address two related interests. After two decades of implementation, the legislative directive to restore nutrient-impaired waters remains unmet in the Neuse estuary. In the intervening period, population in many communities not subject to the rule has expanded greatly (sometimes exponentially) and continues to do so. It is reasonable to expect that this substantial, ongoing growth is a significant source of nutrients to the estuary and thus appropriate to address toward the regulatory objective of the strategy. Application by staff of similar inclusion criteria to those used during the original rulemaking points to the addition of these jurisdictions to the rule. Thus, these additions are also suggested in the interest of making this rule current as part of the periodic review process.

TABLE 6-1 POPULATION GROWTH OF PROPOSED NEUSE COMMUNITIES (2000-2010)

Local Government	Pop Census 2000	Pop Census 2010	Annual Population Growth (2000-2010)
Apex	8,183	11,493	331
Morrisville	4,967	12,497	753
Holly Springs	7,292	16,932	964
Fuquay	3,740	10,120	638
Knightdale	6,894	11,480	459
Wendell	4,414	5,814	140
Rolesville	1,407	3,840	243
Wake Forest	13,234	29,420	1,619
Clayton	8,566	15,963	740
Nash County	9,590	11,628	204
Green County	16,872	19,256	238
Wilson County	18,949	21,229	228
Pitt County	20,380	24,102	372
Craven County	36,417	44,106	769

Source: US Census Data for 2000 and 2010

Annual population growth data for the proposed communities is provided Table 6-1. Populations shown above are for the portion of the population located within the area of the municipality or county within the Neuse watershed

and were obtained from the 2000 and 2010 population census[70]. Only municipalities and counties with populations of at least 5,000 and 20,000 people, respectively, were considered. Of those local governments that met that initial criteria those with annual growth rates of approximately200 people or more per year over the 2000 – 2010 time period are proposed to be added to the rule.

The fifteen local governments currently subject to the rule make up 46% of the land area in the Neuse River Basin. The sixteen proposed local governments cover another 28% of the basin. Adding these communities and increasing the area required to meet stormwater post-construction nutrient export targets will result in additional reductions in nutrient inputs into the Neuse Estuary. The full list of local governments currently subject to the rule and those being proposed is provided in Table 6-2.

TABLE 6-2 CURRENT & PROPOSED ADDITIONAL LOCAL GOVERNMENTS SUBJECT TO NEUSE STORMWATER RULE

Currently Subject to Rule		Proposed to be Added to Rule	
Municipalities	**Counties**	**Municipalities**	**Counties**
Durham	Orange	Apex	Nash
Cary	Durham	Morrisville	Green
Raleigh	Wake	Holly Springs	Wilson
Garner	Johnston	Fuquay	Pitt
Smithfield	Wayne	Knightdale	Craven
Goldsboro		Wendell	
Wilson		Rolesville	
Kinston		Wake Forest	
New Bern		Clayton	
Havelock		Winterville	
		Greenville	

6.2.1.2 *REVISION OF ONSITE TREATMENT REQUIREMENTS*

The most significant technical change proposed is replacement of the threshold approach for determining onsite treatment requirements described above to a more direct requirement for a primary SCM at or above 24% built-upon area (BUA), which is the default minimum high density threshold for Phase II stormwater requirements established in the late 1980's and generally equates to the density of two dwelling units per acre of development. This change is needed to address an unintended gap in control requirements. It would update the rule based on implementation experience and adapt it to the intervening evolution of other state stormwater programs.

The current onsite treatment thresholds of 6 lbs TN/ac/yr for residential and 10 lbs TN/ac/yr for commercial/industrial development projects equate to approximately 36% BUA and 57% BUA respectively as

[70] U.S. Census Bureau. 2000 & 2010. Census Data Retrieved From https://www.census.gov/topics/population.html

estimated with current tools. These unintentionally loose offsite thresholds, combined with what became established as the comparatively low cost of the prevailing offsite offset option, has resulted in virtually exclusive use of the offsite option by any development below the thresholds. While the offsite option was desired and intentional in the original rule as a cost-effective outlet above certain intensities to provide an alternative to the use of more than one BMP per catchment, the intent was also to require treatment by at least one SCM on all development above a minimum intensity threshold to provide not only general water quality protection for receiving waters, but also protection of those receiving streams from the destabilizing and degrading hydrologic impacts of uncontrolled stormwater runoff produced by graded, paved, and piped or channelized developed lands.

Ironically, the offsite loading rate thresholds chosen in the current rule resulted in fewer developments installing stormwater controls than in areas not subject to the rule but subject to other state stormwater regulations.

NPDES stormwater regulations for general water quality protection purposes, as well as most levels of Water Supply Watershed protection and Coastal Stormwater rules use the density-based approach of requiring an SCM at and above 24% BUA. Thus, development in the many Neuse communities not currently subject to the Neuse stormwater rule but subject to these other rules faces more stringent onsite requirements than does development in Neuse rule communities.

Regarding the currently subject Neuse communities, in those where NPDES stormwater rules also apply, those rules defer to the Neuse requirements as satisfying NPDES, which effectively maintains the unintended gap in control requirements in currently subject communities.

6.2.1.3 REPLACEMENT OF CURRENT NUTRIENT LOAD ESTIMATORS WITH THE SNAP TOOL

Under the proposed rule, use of the Stormwater Nitrogen and Phosphorus Tool (SNAP) or its successor is required for calculating runoff nutrient loads and SCM load reductions to determine any offset needs and demonstrate rule compliance. The SNAP tool calculates nutrient load reductions by all SCMs for which Minimum Design Criteria rules have been approved by the EMC. Its credit calculations are detailed in the DEMLR document *North Carolina Stormwater Control Measure Credit Document* (NCDEMLR 2017)[71]. SNAP will become the single stormwater compliance tool as regulations allow.

SNAP will replace the much simpler, weighted export coefficients method used in the Neuse as well as the Tar-Pamlico method, which was the first NC use of the same core calculation used in SNAP. The Neuse and Tar-Pamlico tools produce very similar results and provide the same SCM credit rates. Thus, for simplicity this analysis will rely exclusively on the Tar-Pamlico method to quantify baseline conditions for both Neuse and Tar-Pamlico rules.

[71] North Carolina Division of Energy, Mineral, and Land Resources, 2017. North Carolina Stormwater Controls Credit Document. https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Stormwater/BMP%20Manual/SSW-SCM-Credit-Doc-20170807.pdf

6.3 COST ANALYSIS, NEUSE STORMWATER RULE

6.3.1 ANALYTICAL APPROACH - OVERVIEW

To develop estimates of costs and cost savings related to the proposed rule revisions, separate calculations were developed for "current programs" (those local governments already subject to the Neuse Rule) and "new programs" (the 16 additional local governments proposed to be added to the rule).

Summary of Methods: Estimating New Development SCM and Offset Needs & Associated Costs

Utilizing the basic regulatory requirements and associated development acreages described above for each of these two program categories – Current and New - in each basin, a comparison was made between the level of post-construction stormwater treatment, including both SCM installations and nutrient offsets, that would be required by the stormwater regulations currently in place and the proposed new requirements. Each of the four resulting program scenarios across the two basins presented different baseline regulatory conditions, leading to different net rule impacts. The difference between the requirements was quantified in terms of 1) the fraction of development acres requiring an SCM that previously did not as well as those that did, and 2) the net change in pounds of nutrient offset needed per acre each year across all development acres to meet the requirements of the new rule. The steps of the analytical approach are outlined below are followed by a more detailed discussion of each step. Each of the following steps was taken for each of the four program scenarios: Neuse Current Programs; Neuse New Programs; Tar-Pamlico Current Programs; and Tar-Pamlico New Programs. Results for the two Neuse scenarios will be discussed in this chapter, while the two Tar scenario results will be covered in the next chapter.

1. **Determine Annual Acres of Development:** Estimate collective acres of new development occurring annually within the basin, grouped by increasing intensity of land use into the following types: County Residential; Municipal Residential; and Commercial/Industrial/Multi-Family.

2. **Calculate Development Unit-Area Nutrient Export Rates:** Calculate the range of unit-area loading rates (lb/ac/yr) associated with each of the three development types using the stormwater accounting tools applicable to each regulatory regime - baseline and proposed rule condition - for both untreated and treated post-construction conditions.

3. **Estimate SCM Needs :** For each development type, compare untreated unit-area export rates to the onsite treatment threshold applicable to that type to determine fraction of development acres that requires an SCM. Do this for both baseline and proposed rule conditions and compare results to yield fraction of each development types' acres requiring treatment.

4. **Estimate Nutrient Offset Needs:** For both baseline and proposed program scenarios, for each development type requiring treatment, make an assumption about the SCM likely to be installed, calculate the export rate with that SCM treatment, and then calculate the difference between the treated export rate and the target rate (3.6lb TN/yr in the Neuse) to determine any additional offset needs. Three SCM selection scenarios were used: the assumed "most likely" SCM selection, which was continuation of the proportional mix of SCMs currently in use – wet ponds, wetlands and bioretention; an assumed "high-end" cost scenario using a bioretention SCM everywhere; and a "low-end" cost scenario using constructed wetlands on all Coastal Plain acres and infiltration SCMs on all Piedmont acres. For baseline case, confirm that SCM treatment reduces export rate below the applicable 6 or 10 lb TN/ac/yr offsite treatment threshold. For both baseline and proposed scenarios, calculate the difference between treated export

rates and rule loading rate target of 3.6 lbs TN/ac/yr to determine the amount of nitrogen offset needed in pounds per acre developed per year. Multiply by development acres to yield pounds per year offset needed.

5. **Calculate Costs & Savings:** For each development type, calculate the net costs or cost savings for both the SCM type used and the resulting offset needs. Treatment costs consisted of up-front and annual operation and maintenance. Costs were projected for 10 years' worth of implementation and converted to net present value following OSBM guidance.

6.3.2 CURRENT NEUSE LOCAL GOVERNMENTS' REGULATORY BASELINE

A GIS-based analysis (described in Section 6.3.4) was combined with a synthesis of the post-construction requirements of various regulations outlined in Table 6-5 below to determine that in 75% of the combined area of the fifteen jurisdictions currently subject to the rule, developments are required to install 1 SCM when the untreated export rate exceeds 6 lbs/ac/yr for residential and 10 lbs/ac/yr for commercial, and to offset the remainder to meet 3.6 lbs/ac/yr. In the other 25% of current jurisdictional areas, developments must install an SCM when they exceed 24% BUA, and then similarly offset the remainder. This 75/25 split in current requirements provided the foundation of pre/post comparative cost calculations for the currently subject Neuse communities.

As show in Table 6-3 below, currently subject Neuse local governments are potentially affected by one or more of five separate state stormwater mandates in portions or the entirety of their jurisdictions within the basin. These rules could theoretically subject developers to at least one, potentially two or occasionally three regulations. In practice, the state takes steps to avoid or minimize regulatory redundancy. Also, two of the regulations – WSW and ORW/HQW – are special protections applied to smaller watersheds that generally cover only a fraction of a given jurisdiction's area, and one regulation – Coastal – applies to only two of the fifteen current Neuse communities. To avoid unnecessary regulatory complexity, where Phase II and other stormwater regulations overlap, Phase II defers to these other regulations, including NSW, regarding post-construction stormwater control requirements. Thus, in practice development is largely subject to one or potentially two sets of requirements. As described here, those requirements differ by location.

Recognizing that development is not distributed uniformly over the landscape, the acreage of the regulatory domains suggested in Tables A-1 through A-7 in Appendix A are not a good predictor of the proportions of development that will actually occur under each. Staff instead used the history of actual development under different regulatory requirements and of differing intensities as a predictor of future development. A GIS analysis was conducted on the extent of development that occurred in the basins for the most recent available 10-year time span for each of four (current and proposed local programs in both Neuse and Tar-Pamlico Basins). Ten years was assumed to be a sufficient time span to provide a reliable average predictor of annual growth rate going forward. The most recent available span of NLCD land cover data was 2001-2011, a minority of which was the economic recession. Acreage changes over the ten years were compiled for each of four NLCD development intensities, which were then consolidated to the three development types identified in Section 6.3.1 above for each of the local jurisdictions under each of the four program categories. Values were then converted to average annual acreage changes.

Staff evaluated the extent of the various regulatory regimes in each jurisdiction and then collectively to determine aggregated post-construction requirements for both the current regulatory baseline condition and for the proposed rule for each of the four program categories – existing subject communities and proposed communities in each of the two river basins. Results of this analysis are provided in the following sections.

TABLE 6-3 BASELINE STORMWATER PROGRAM COVERAGE FOR EXISTING NEUSE LOCAL GOVERNMENTS

Local Governments	NSW	Phase II	WSW	Coastal	ORW/HQW
Durham	x	x	x		
Cary	x	x	x		
Raleigh	x	x	x		
Garner	x	x	x		
Smithfield	x		x		
Goldsboro	x	x	x		
Wilson	x		x		
Kinston	x				
New Bern	x	x		x	
Havelock	x			x	
Orange County	x	x	x		
Durham County	x	x	x		
Wake County	x	x	x		
Johnston County	x		x		
Wayne County	x				

Legend:
NSW - Nutrient Sensitive Waters; the Neuse New Development Stormwater rule
Phase II - Federal Clean Water Act NPDES Stormwater
WSW - Water Supply Watershed
ORW/HQW - Outstanding Resource Waters/High Quality Waters

6.3.3 PROPOSED NEUSE LOCAL GOVERNMENTS' REGULATORY BASELINE

The same approach described in Section 6.3.2 above was used for the proposed communities (Table 6-4) to determine that currently, due largely to Phase II requirements noted in Table 6-5, virtually all sixteen proposed Neuse local governments require a primary SCM when development exceeds 24% BUA. However, nutrient loading rate targets do not apply to these communities, so they are not required to "buy down" any excess nutrient exports. The GIS analysis described above was used to determine the annual development acreage associated with these requirements.

TABLE 6-4 BASELINE STORMWATER PROGRAM COVERAGE FOR PROPOSED NEUSE LOCAL GOVERNMENTS

Local Governments	NSW	Phase II	WSW	Coastal	ORW/HQW
Apex		x	x		
Morrisville		x	x		
Holly Springs		x			

Fuquay		x			
Knightdale		x			
Wendell		x			
Rolesville		x	x		
Wake Forest		x	x		
Clayton		x	x		
Nash County		x	x		x
Green County					
Wilson County			x		x
Pitt County		x	x		
Craven County				x	

Legend:

NSW - Nutrient Sensitive Waters; the Neuse New Development Stormwater rule

Phase II - Federal Clean Water Act NPDES Stormwater

WSW - Water Supply Watershed

ORW/HQW - Outstanding Resource Waters/High Quality Waters

TABLE 6-5 OUTLINE OF CURRENT REQUIREMENTS FOR STATE-MANDATED STORMWATER PROGRAMS, NEUSE RIVER BASIN

Requirement **(Based on Classification)**	WS-II BW	WS-III BW	WS-IV PA	Phase II	Neuse NSW
Permitting Authority	Local Gov't	Local Gov't	Local Gov't	Local Gov't	Local Gov't
Low Density Max. BUA **(1)**	12%	24%	24%	24%	N/A
High Density Max BUA **(2)**	30%	50%	70%	None	N/A
Low Density Setback (2.5)	30'	30'	30'	30'	50' RB
High Density Setback (2.5)	100'	100'	100'	30'	50' RB
S/W Control Req. for High Density **(3)**	1" R/O	1" R/O	1" R/O	1" R/O	1" R/O
TSS Removal Requirement	85%	85%	85%	85%	85%
Stormwater Drawdown **(4)**	Note 4	Note 4	Note 4	Note 4	Note 4
Flow Control Req.	No	No	No	1-yr 24-hr peak match	1-yr 24-hr peak match
Vegetated Conveyances for Low Density **(5)**	Yes	Yes	Yes	Yes	N/A
Deed/Property Restrictions Required **(6)**	Yes	Yes	Yes	Yes	N/A
Cluster Dev. Allowed **(7)**	Yes	Yes	Yes	Yes	N/A
10/70 Provision Allowed **(8)**	Yes	Yes	Yes	No	N/A
NSW Load Limits **(10)**	No	No	No	No	3.6 lb N/ac/yr

Legend: BUA – Built-Upon Area; BW – Balance of Watershed outside Critical Area; N – Nitrogen; NSW – Nutrient Sensitive Waters, P – Phosphorus; PA – Protected Area, RB – Riparian Buffer, R/O – Runoff, S/W – Stormwater; TSS – Total Suspended Solids, WS – Water Supply watershed

6.3.4 DETAILED ANALYTICAL APPROACH

Step 1: Estimating Annual Acres of New Development

Staff used GIS analysis to compare the 2001 and 2011 National Land Cover Database (NLCD) datasets to develop estimates of the annual acres of development for both the current and new communities. Since some local governments are located within multiple watersheds, this approach made it possible to develop growth estimates for just the area of the local government located within the Neuse River Basin. Acreages in each of four NLCD developed land cover categories were aggregated into the following three development types based on percent built-upon area (BUA):

1. County Residential (0-20% BUA)
2. Municipal Residential (20-50%BUA)
3. Commercial & Industrial (50-90% BUA)

TABLE 6-6 ESTIMATED RATE OF NEW DEVELOPMENT IN NEUSE BASIN JURISDICTIONS

Aggregated Development Type	Current Neuse Communities (ac/yr)	New Neuse Communities (ac/yr)
County Residential	773	399
Municipal Residential	1,723	935
Commercial / Industrial	200	88
Total	2,696	1,422

As stated above, staff chose to compare developed acres over the most recent 10-year time span of NLCD land cover data (2001-2011) available as a predictor of future rate of development. Ten years was assumed to provide a reasonable average predictor of annual growth rate going forward. A limitation of this data is that dataset availability resulted in a growth rate period ranging from 7 to 17 years ago. Another, recognized uncertainty in the NLCD data is its pixel resolution of 30 meters. It is speculated that this factor on average may lead to underestimates of impervious acres, where e.g. narrow bands of pavement are surrounded by pervious cover as with some driveways and roads, but this type of error is more likely also at the low end of development intensity, which was estimated to have no effect on the cost outcomes.

As a check, staff compared the NLCD development acres to development acre estimates based on population changes between 2000-2016. Annual population growth over this sixteen-year period was converted to acres of development using two conversion factors: an assumed 2.58 people per household and 5 households per acre

based on conversion factors from the US Census Bureau and the National Home Builders Association.[7273] This population-based check produced an estimated 1,709 acres of annual development in the current communities and 534 acres in the new communities. These values on population growth are significantly lower than the development acres generated from the NLCD land cover data and shown in Table 6-6. A similar comparison was done in the Tar-Pam basin with similar results. Assumptions used in this population-based method introduce several uncertainties, but the results provided a qualitative check on the remotely sensed acreage estimates. The results improved confidence in the NLCD values, which provide a more direct estimate of future land development and density.

Step 2: Unit-Area Loading Rates for Development Acres

Each of the three development types was assigned a range of untreated unit-area loading rates in pounds per acre per year based on the range of impervious percentage it covers. For the baseline condition, the current method, the Tar-Pamlico Stormwater Tool was used while as called for in the proposed rule, the SNAP tool was used for the proposed condition. Nutrient export ranges were produced for each development category by performing multiple scenario runs of each tool using the ranges of built-upon area. Results are summarized in Tables 6-7 and 6-8 below.

TABLE 6-7 DEVELOPMENT UNIT-AREA LOADING RATES, BASELINE (TAR-PAMLICO STORMWATER TOOL)

Treatment Condition	Municipal Residential		Commercial / Industrial	
	Nitrogen (lbs/ac/yr)		Nitrogen (lbs/ac/yr)	
	Low	High	Low	High
Untreated	3.5	8.5	8.5	15.6
Most Likely Mix: Wet Pond/ Wetland/Bioretention	2.4	5.9	5.9	10.7

TABLE 6-8 DEVELOPMENT UNIT-AREA LOADING RATES, PROPOSED RULE (SNAP TOOL)

Treatment Condition	Municipal Residential		Commercial / Industrial	
	Nitrogen (lbs/ac/yr)		Nitrogen (lbs/ac/yr)	
	Low	High	Low	High
Untreated	3.5	7.0	7.0	11.6
Bioretention	1.1	2.2	2.2	3.7

[72] Use Census Bureau, 2012. Households and Families: 2010. https://www.census.gov/prod/cen2010/briefs/c2010br-14.pdf

[73] P. Emrath, National Homebuilders Association, Development Project Survey 2014. Typical American Subdivisions. https://www.nahb.org/-/media/Sites/NAHB/supporting-files/8/Typ/TypicalAmericanSubdivisionFINAL_20140902080612.ashx?la=en&hash=2AD676EB5D99EB05F4C99EFAF9F5E133CBFD4217

Most Likely Mix: Wet Pond/Wetland/Bioretention	2.3	4.4	4.4	7.4
Low-Cost Pair: Wetland/Infiltration*	0.8 - 1.1	1.4 - 2.0	1.4 - 2.0	2.4 – 3.4

** = Range of unit area loading rates provided for Wetland/Infiltration to reflect the different weighting of SCM use in the Piedmont and Coastal Plain.*

Step 3: Estimate SCM Needs

Analysis of the untreated nitrogen export ranges shown above under the current and proposed rule were used to estimate the number of development acres that would require treatment under the proposed rule that currently do not under the baseline condition.

Current Programs: The fraction of current programs' development acres requiring treatment was calculated for each of the two baseline scenarios identified in Section 6.3.2. In the first scenario all development over 24% BUA already requires an SCM under other applicable rules. Based on the impervious ranges of the three development types, essentially all municipal residential and all commercial/industrial development acres would require an SCM while county residential development would not because of its lower density.

In the second baseline scenario, only the current rule applies. Staff calculated the fraction of development acres that would require an SCM based on the current rule's offsite treatment thresholds (6 lbs/ac/yr for residential and 10 lbs/ac/yr for commercial). Ranges of untreated loading rates were generated for residential and commercial and compared to their respective offsite thresholds. The fraction of the loading range falling above each offsite threshold was taken to approximate the fraction of development requiring onsite treatment. This outcome assumes that development intensity is evenly distributed by acres across the impervious range for each type.

The resulting fractions of current programs' development acres requiring treatment for each of the three development types were weighted by the percent of all acres subject to each of the two baseline scenarios (25% and 75% respectively) into a final fraction of development that would require an SCM under the proposed rule for each development type. This was then compared to the existing condition to determine the fraction of development that would need treatment under the proposed rule that does not currently. This fraction was then multiplied by the annual acres of development for the corresponding development type. The result is the acres needing an SCM under the new rule. The results of this analysis are presented in Table 6-9 below. Detailed calculations tables for this analysis are provided in the Appendix.

New Programs*:* The same approach was used for the new local governments being added to the rule with only minor adjustments made to reflect the different baseline conditions. In this case all new programs have the same baseline condition of 1 SCM if development is greater than 24% BUA.

The results of the analysis for both current and new programs are presented in Table 6-9 below. Detailed calculations tables for this analysis are provided in the Appendix.

Step 4: Apply SCMs, Estimate Nutrient Offset Needs

Analysis continued by development type for both the baseline condition and the proposed rule, which again were compared. Treated loading rates were compared against the rule rate target of 3.6 lb N/ac/yr to estimate any remaining reduction needs, which would be addressed via offset payment. The results are presented in Table 6-9. Detailed calculation tables are provided in the Appendix.

Untreated per-acre runoff loading rates were reduced to treated values based on three SCM scenarios. While 7 different nutrient SCMs are available under the current Neuse and Tar-Pamlico rules, for its 2H rules fiscal analysis, DEMLR found that developers currently rely on one of 3 SCMs in 95% of development cases: where stormwater treatment is required under state rules, approximately 82% of all acres in both Coastal and Piedmont settings are treated by wet ponds; in the Piedmont, another 10% of acres are treated by constructed wetlands with another 8% by bioretention (these proportions differ from those based on the number of each practice used as identified in the appendix of DEMLR's fiscal analysis, which are 50:30:15%; acres treated proportions were derived by combining these proportions with average practice drainage areas provided in each practice chapter).[74] Thus, to simplify the analysis in a way that reflects understood practice, for the baseline regulatory condition, weighted composite nitrogen and phosphorus reduction efficiencies were used reflecting these proportions of SCMs.

For the proposed rule condition, costs per acre treated were estimated and compared for the range of SCMs that will be available. As shown in Table 6-10, it was determined that there are significant cost differences among SCMs. While a ranking of SCMs for absolute nutrient loading rate reduction indicates that bioretention is second only to infiltration in performance, the fact that the nutrient offset option remains very inexpensive compared to the use of SCMs to meet targets, combined with high per-acre treated cost of bioretention, suggests that absolute nutrient reductions are unlikely to be an important developer SCM selection criterion. Similarly, values were developed for SCM cost-effectiveness for nutrient removal, but nutrient cost-effectiveness was also identified as likely of low importance for the same reason as absolute nutrient reduction. Considering changes that may impact future SCM selection, infiltration was approved by DEMLR recently and achieves high nutrient removal at a relatively low cost, however its site versatility may be shown to be relatively limited. In general, it must be recognized that SCM choice on any development involves a complex set of considerations. The proposed rule requirements and new accounting tool will introduce a new set of considerations, the response to which by developers cannot be known presently.

Considering the above factors, staff developed estimates for three SCM scenarios – a "most likely" selection bracketed by high- and low-cost scenarios. Staff reached the view that SCM choice will most likely continue to be driven primarily by per-acre treated cost. Thus, the "most likely" SCM scenario for the proposed rule condition was identified as continuation of the current SCM mix and proportions of wet ponds, wetlands, and bioretention. To provide sensitivity analysis on the theoretical range of costs, for a high-end cost estimate staff used bioretention, by our estimate the most expensive per-acre treated practice other than sand filters, which are impractical for most site applications. The two least expensive practices per-acre treated were estimated to be constructed wetlands and infiltration. Considering their respective suitabilities to Coastal Plain and Piedmont settings, development acres were totaled for these two ecoregions for each of the four program scenarios, and low-end cost estimates were developed accordingly.

The assumption that the current SCM Mix is the "most likely" SCM scenario for the proposed rules condition is based on several observations. While the SCM pair of infiltration and wetland represent high benefit and low cost, there are limitations on where they can be implemented which is likely the main reason why they are not used more often. While this analysis takes into account their respective suitabilities to the coastal and piedmont areas there are other limiting factors as well, primarily space and soil considerations. Wet ponds require a smaller

[74] NC DEMLR, 2015. *Regulatory Impact Analysis, Stormwater Management Rules: 15A NCAC 2H .0100 and 2H .1000.* North Carolina Division of Energy, Mineral and Land Resources, Stormwater Permitting Program. Dec. 8, 2015. Appendix C.

footprint than wetlands for each acre treated. Similarly, some of the poorer soils in the piedmont would require a significantly larger footprint for an infiltration system when compared to bioretention.

Other limiting factors related to the lack of implementation of infiltration devices may be past regulatory barriers, such as requiring a grassed swale and level spreaders for overflow runoff. These additional requirements in the past added significant space and cost considerations and have only recently been removed during the recent 2H Stormwater rules readoption process.

Perhaps in time more developers will switch to implementing wetlands and infiltration devices to meet the requirements of the proposed stormwater rules. If so, such a shift in SCM selection will only contribute to reducing costs of implementing the rules relative to the cost of the most-likely SCM mix assumed for this analysis.

Offset Method: Current Programs: For each development type, two cases were evaluated. The first was untreated development loading above the 3.6 lbs/ac/yr rule target but below the offsite threshold. The second was treated but still above the rule target. The baseline analysis was simplified by the fact that one SCM always reduced export rate below the offsite thresholds.

Both cases, when compared to the3.6 lbs/ac/yr target, yielded lb/ac offset needs that were then weighted by the fractions of development acres under each case to yield overall lb/ac offset needs for each development type. Again, the difference was taken between baseline and proposed conditions to yield net change in per-acre offset need, which was applied to development acreage to yield pound N per year offset needs for each development type. The results are presented in Table 6-9 below. Detailed calculations tables are provided in the Appendix.

The three different treatment scenarios produced different levels of offset need. Both the “most likely” treatment scenario and the low-end cost scenario produced net negative, i.e. a reduction in, offset needs for development under the current programs and net positive offset needs for development under the new programs. New programs required additional offsets because no nutrient targets apply under current rules and the “most likely” SCM mix is insufficient to reach the proposed rule target. This is true across both basins. Bioretention was notable - in all proposed rule cases it reduced loading to meet or surpass the rule target, avoiding offset needs. Since under the current rule and tool crediting, bioretention often did not achieve the target, resulting in baseline case offset needs, net offset needs for the bioretention scenario were negative, i.e. a reduction in, offset need, for the baseline case and zero for the new programs case. This is also true in both basins.

Offset Method: New Programs: The same method was applied to new programs as done for current programs. See directly above for a summary description of results. The results for both current and new programs are presented in Table 6-9 below. Detailed calculations tables are provided in the Appendix.

The net reductions in nutrient offsets needed by current programs in both basins under the proposed rule is the result of two factors. The first and the largest factor, the proposed rule requires one SCM for all development projects with over 24% built-upon area. As described earlier, the intent of this requirement is to close an unintended gap in onsite treatment requirements that exists in current Neuse and Tar-Pamlico programs, with the specific objective of requiring more stormwater treatment onsite. The companion outcome is of course reduced need for offsite offset credits. New programs do not have this gap, resulting in some amount of positive offset need in both basins.

TABLE 6-9 ADDITIONAL SCMS & OFFSETS NEEDED: NEUSE CURRENT & NEW PROGRAMS

	Neuse Current				Neuse New			
	Muni Residential		Commercial Industrial		Muni Residential		Commercial Industrial	
Total Annual Development Acres (ac/yr)	1,723		200		935		88	
Net Increase in Treatment: New/Existing Acres	**New**	**Existing**	**New**	**Existing**	**New**	**Existing**	**New**	**Existing**
New/Existing Fractions Needing SCM	37%	63%	15%	85%	0%	100%	0%	100%
New/Existing Acres Needing SCM (ac/yr)	637	1086	31	169	0	935	0	88
Net New Offsets: All Development Acres	**TN**		**TN**		**TN**		**TN**	
Most Likely SCMs Mix - Per Acre Offset Need (lb/ac/yr)	-0.91		-2.61		0.42		2.98	
Most Likely SCMs Mix - Total Offset Need (lb/yr)	-1570		-521		391		262	
Hi End-All BR - Per Acre Offset Need (lb/ac/yr)	-1.33		-5.59		0		0	
Hi End-All BR - Total Offset Need (lb/yr)	-2290		-1117		0		0	
Low End Pair - Per Acre Offset Need (lb/ac/yr)	-1.32		-5.34		0.03		0.63	
Low End Pair - Total Offset Need (lb/yr)	-2270		-1067		27		56	

The second factor contributing to reduced offset needs in current programs is that advances in the scientific understanding of SCM nutrient removal function in general, as incorporated in the new SNAP tool, have coincidentally resulted in generally greater unit load reduction credits for SCMs, largely as a result of shifting away from the conventional, fixed reduction efficiency approach to SCM performance accounting and to the fixed effluent concentration model to account for performance variability.

6.3.5 CALCULATION ASSUMPTIONS

General Assumptions

- Instead of separate calculations for each local government, we carry out all calculations for all areas in the basin subject to the rules collectively, divided instead by development intensity into 3 development types – county residential, municipal residential, and commercial/industrial/multi-family residential.

Development Assumptions

- We assume annual acres of new development will occur at the average rate that existed between 2001 and 2011 per the GIS analysis of the National Land Cover Database described in Section 5.2.3 above.
- Types of new development are assumed to occur in the same proportions in the future as they existed between 2001 and 2011 as interpreted through Multi-Resolution Land Cover data available from the National Land Cover Database.
- We assume all new development acres as estimated from the NLCD will be subject to New Development Rules; we did not attempt to apply a lower acreage threshold reflecting the rule's disturbance thresholds.

- We did not attempt to distinguish DOT highways (which may not be subject to the rules) from other development types. To the extent they are not required to treat runoff or offset their impacts, costs provided are an overestimate.
- We assume all new development will be part of common plans of development (or commercial, industrial, etc.) rather than isolated single-family residential. We did not attempt to quantify what proportion of new development would be isolated small-lot SFR that would fall below thresholds for the Rules.
- We did not obtain and apply extraterritorial jurisdictional boundaries of municipalities in assigning NLCD development acres to local governments to project future development rates for affected municipalities and counties. The net effect is likely an underestimate of development acres for subject cities and a corresponding overestimate for subject counties. This may have skewed to varying degrees our estimates of the proportions of development acres under different existing regulatory requirements for the current programs. It may also have underestimated annual development acreage where subject ETJ's fall in counties not subject to the rules to the extent that those acres are not offset by the reverse case.
- We assume that the loading characterizations we developed for each development type provides a reasonable approximation of the variations in impervious types that will occur across projects, jurisdictions and time. In assigning pervious cover type, we conservatively assumed the higher loading rate managed pervious type in all cases rather than assigning some portion to forest cover.
- In developing loading ranges for each development type, we assume that project acres are uniformly distributed across the range of development intensities within each development type.
- The following land cover mixes were assumed while using the SNAP and Tar-Pamlico stormwater tools for developing untreated nutrient export ranges for each development type and the resulting treated export ranges under the three different SCM treatment scenarios:
    - 7% BUA: Land Cover Mix = 3% roof, 4% parking, 93% lawn ("5ac res lawn")
    - 10% BUA: Land Cover Mix = 4% roof, 6% parking, 90% lawn ("2ac res lawn")
    - 15% BUA: Land Cover Mix = 5% each roof, road, parking; 85% lawn
    - 24% BUA: Land Cover Mix = 8% each roof, road, parking; 76% lawn
    - 36% BUA: Land Cover Mix = 10% each roof, road, parking; 70% lawn
    - 60% BUA: Land Cover Mix = 20% each roof, road, parking; 40% lawn

SCM Assumptions

- We assume baseline stormwater treatment in the Neuse Basin is being achieved through a combination of 82% of acres treated by Wet Ponds, 10% by Wetlands, and 8% by Bioretention based on a survey conducted in 2017 by NCDEMLR as part of the 2H Stormwater Rules Fiscal Analysis. We did not attempt to quantify shifts in SCM use in coastal areas given they comprise a relatively small fraction of subject acres and for that small fraction are believed to vary in a minority of cases.
- We assume the "most likely" SCM combination under the proposed rule will continue to be the baseline combination identified above, based on recognition that the cost of the nutrient offsets that will be available under the proposed rule are likely to remain relatively very inexpensive for the foreseeable future relative to other onsite treatment options and will not present a significant deterrent to going offsite to meet loading requirements. However, we did not attempt to evaluate the relative cost of a new option in the SNAP accounting tool, oversizing of SCMs, which might provide a viable alternative in marginal cases.
- We assume export loading using the Tar-Pam tool in the baseline condition.

- We assume export loading using the SNAP tool in the proposed condition
- For the "most likely" SCM mix we use a weighted average reduction efficiency to estimate remaining offset needs. To the extent that the average efficiency does not reduce loading in the baseline below the offsite threshold in the upper end of the development type range, we assume that in any individual project the developer will choose the appropriate single SCM from the mix with sufficient reduction potential to meet the offsite threshold.

Offsite Offset Assumptions

- We assume all nutrient offsets will be purchased through the Division of Mitigation Services. This allows us to assume a single nitrogen $/lb offset rate for the Neuse cost calculations. Developers have the option of purchasing offset rates from private nutrient banks which are usually in line with the DMS rates.
- We assume offset credits are awarded for a 30-year duration as is currently practiced under the current Nutrient Offset Rule. (See Notes)
- Staff also assumed a 30-year multiplier for offset need under the proposed rule requirements in order to simulate the need for permanent credits and allow for comparison between both the current and proposed rule.

6.3.6 PRIVATE ENTITY COSTS & COST SAVINGS

Developer costs and cost savings under the rule for ten years' worth of implementation, presented in net present value, are summarized in Tables 6-11 and 6-12 below. SCM Installation costs include the planning, construction, land value, and regulatory transaction costs for installing an SCM. The "most likely" costs result from the SCM scenario of that name as described in Step 4 of the calculations in Section 6.3.5 above. The "most likely" scenario assumed continued use of the three currently used SCMs - wet ponds, wetlands and bioretention - and their proportions. The range reflects at the low-cost end, the Coastal Plain/Piedmont split use of wetlands and infiltration, and at the high-cost end, use of bioretention everywhere.

The current Nutrient Offset rule provides nutrient offset credit for 30 years so when the nutrient offset need for a development is calculated, the annual offset need is multiplied by 30 so the full 30 years of offset credits are purchased upfront when the development goes into place. The net total offset pounds presented in Table 6-9 do not include the 30-year multiplier. However, the 30-year multiplier is applied to these offset estimates in the offset cost calculations in order to capture the true offset cost under the current rule.

Under the proposed rule changes, developers will be required to secure permanent offset credits. As described in Section 5.3.1 of the Nutrient Offset Rule analysis, because all recent offset projects are protected by permanent conservation easements and future projects of the same type will be eligible for permanent credit, this change is not expected to result in changes to the overall cost of offset credit needed for a development project.

As show in Table 6-11, the proposed revisions to the Neuse Stormwater Rule would result in an overall increase in SCM needs and a decrease in nitrogen offset needs for current communities resulting in costs of approximately $27.5 million over a 10 year period under the most likely SCM scenario.

A relatively small increase in cost is expected for development in the new communities (Table 6-12). The new Neuse communities are already implementing Phase II post-construction stormwater or equivalent Coastal or Water Supply Watershed requirements. As a result, developers are already required to implement one primary SCM when built-upon area exceeds 24% BUA. Because the "most likely" SCM scenario assumes continued use of

the same SCM choices, there are no increased treatment costs. However, the current SCMs do not achieve the nutrient targets in higher intensity developments, which leads to the positive offset costs shown in the table. An alternative for developers, as described in the preceding section, is use of the high-end bioretention SCM at significantly greater onsite cost that eliminates offset costs. Bioretention also provides important water quantity benefits over other SCMs. Likewise use of wetlands and infiltration devices represent a low-end cost alternative for meeting the requirements of the proposed rule. Like bioretention, the SCM pair of wetlands and infiltration provide significant hydrologic benefits and a level of onsite nutrient reduction that eliminates offset costs. A full discussion of the benefits off all three SCM scenarios is provided in Section 6.3.6 of this chapter.

Source of SCM Cost Information

For the analysis of SCM costs, staff relied on capital, planning and operation & maintenance cost estimates from the 2010 Falls Lake Fiscal Analysis (NCDWR, 2010)[75]. In that analysis staff produced unit-cost values for a range of SCMs for each of the three development categories, county residential, municipal residential, and commercial & industrial. These costs were based on a detailed in-state economic analysis, included data specific to the North Carolina piedmont (Hunt and Wossink, 2003[76]; Moran and Hunt, 2004)[77].

During the Falls analysis these costs were inflated to 2012 levels. However, given the uncertainties and numerous variables in these cost calculations the costs have not been adjusted further. However, staff have compared the cost estimates used in this analysis with more recent sources of cost information developed by the University of Maryland for the state of Maryland (King and Hagan, 2011)[78]. Those cost values were also used in the 2015 fiscal analysis for the DEMLR 2H stormwater rule revisions (DEMLR, 2015)[79]. The values used here generally show close agreement with SCM cost estimates used in both the DEMLR and Maryland analyses.

---

[75] NC DWR, 2010. *Fiscal Analysis for Proposed Nutrient Strategy for Falls of Neuse Reservoir. June 14, 2010* http://www.fallslake.org/c/document_library/get_file?uuid=2a29f5a4-3db1-4c63-bd63-cad51a5ac385&groupId=38364

[76] Hunt, WF and A. Wossink, 2003. An Evaluation of Cost and Benefits of Structural Best Management Practices in North Carolina.

[77] Moran, A. and W.F. Hunt, 2004. BMP Cost Estimate Study. Cooperative Extension Service, North Carolina State University, Raleigh, NC.

[78] King, Dennis and Hagan, Patrick. 2011. "Costs of Stormwater Management Practices in Maryland Counties."

Maryland Department of the Environment and University of Maryland, Center for Environmental Science (UMCES). Available at: www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/PhaseIIBayWIPDev.aspx.

[79] NC DEMLR, 2015. *Regulatory Impact Analysis, Stormwater Management Rules: 15A NCAC 2H .0100 and 2H .1000.* North Carolina Division of Energy, Mineral and Land Resources, Stormwater Permitting Program. Dec. 8, 2015.

TABLE 6-10 ESTIMATED STORMWATER SCM COSTS PER-ACRE TREATED (FROM FALLS FISCAL ANALYSIS)

Avg Annual Undiscounted 30-Year Lifetime SCM Cost Per-Ac Treated ($/Ac/yr)		
	Municipal Residential	Commercial/ Industrial
Stormwater Wetland	$ 224	$ 351
Infiltration Device	$ 332	$ 447
Grassed Swale	$ 357	$ 420
Wet Pond	$ 464	$ 560
Dry Pond	$ 464	$ 560
Level Spreader/Filter Strip	$ 509	$ 1,147
Bioretention	$ 708	$ 867
Sand Filter	$ 2,529	$ 2,637

TABLE 6-11 SUMMARY OF DEVELOPER COSTS, CURRENT NEUSE COMMUNITIES (10 YEARS NPV)

Development Type / Cost		SCM Installation	SCM O&M	N Offset
Municipal Residential	Most Likely	$31.99M	$1.77M	($6.24M)
	Range	$11.24M - $82.98M	$504K - $6.01M	($6.24) – ($8.83M)
Commercial Residential	Most Likely	$1.81M	$90K	($1.93M)
	Range	($501K) - $8.91M	($64K) - $560K	($1.93M) – ($4.13M)
Total (NPV)	Most Likely	$33.80M	$1.86M	($8.17M)
	Range	$10.74M - $91.90M	$442K - $6.58M	($8.17) – ($12.78)
Grand Total (NPV)	Most Likely	**$27.49M**		
	Range	**($1.60M) - $85.88M**		

TABLE 6-12 SUMMARY OF DEVELOPER COSTS, PROPOSED NEUSE COMMUNITIES (10 YEARS NPV)

Development Type / Cost		SCM Installation	SCM O&M	N Offset
Municipal Residential	Most Likely	$0	$0	$1.57M
	Range	($11.26M) - $27.67M	($687K) - $2.30M	$0 – $1.57M
Commercial Residential	Most Likely	$0	$0	$1.05M
	Range	($1.02M) - $3.12M	($64K) - $216K	$0 - $1.05M
Total (NPV)	Most Likely	$0	$0	$2.63M
	Range	($12.28M) - $30.80M	($751K) - $2.52M	$0 - $2.63M
Grand Total (NPV)	Most Likely	**$2.63M**		
	Range	**($12.70M) - $33.31M**		

6.3.7 COSTS TO STATE GOVERNMENT

Under the proposed rule the Division is responsible for developing and providing guidance for local program development, accounting methods and expectations, review and approve local program proposals, including ordinances, provide guidance to implementing local governments, review annual implementation reports submitted by local governments, and performing compliance oversight on local programs. These activities can be combined into three distinct task categories:

1. Developing Model Program & Ordinance
2. Reviewing Local Government Programs
3. Annual Report Review and Technical Assistance

These activities are already being implemented by state staff for the current local governments, so they do not represent new costs. However, as a result of the proposed revisions to these rules the state will need to make minor modifications to the current model program and ordinance, so they can be used as guidance by local governments to modify their local programs. The added communities will also need to use the updated model program and ordinance to develop their own local programs to aid in the implementation of the rule requirements.

Model Program Revisions and Local Program Approval

Since there are only a limited number of revisions that will require incorporation into the existing model program documents it will not take a significant amount of time for staff to make the revisions. However, staff will also need to review and approve both the 15 revised local programs and 16 new local programs submitted by the local

governments. Because of the small number of revisions, it is not anticipated that review of the revised local programs will require much staff time. However, the review of the 16 new local government programs will likely take longer. The associated opportunity cost for the task of updating the model program and reviewing local government programs is provided in Table 6-13 below.

Annual Report Review & Technical Assistance

Local governments subject to the rule must submit an annual report to the Division each year to report on development activities within their jurisdiction and their progress in implementing the rule requirements. Division staff are tasked with reviewing these reports and providing technical assistance to local governments when question arise regarding implementation of the rules. This work is already completed on an annual basis by current staff for the 15 local governments subject to the current rule. Review of reports from the 16 new local governments would be done by the same staff but represents an opportunity costs. The associated opportunity cost for reviewing the annual reports of from the 16 new communities is provided in Table 6-13 below.

TABLE 6-13 STATE GOVERNMENT COSTS

Task	One-time Cost	Total Cost (10 years NPV)
Update Model Program & Ordinance	$13,500	-
Review & Approve Local Programs	$20,250	-
Review Annual Report & Provide Technical Assistance	-	$96,621

Assumptions

- We assume updates to the current model program guidance document and model ordinance can be completed by current staff in 300 hours.
- We assume the model program update and review of local programs is a one-time cost.
- We assume 450 hours of total staff time to review all revised and new local government programs which will allow for any necessary back and forth on revisions.
- Annual report review and technical assistance are assumed to be annual costs so both an annual and NPV cost estimate are provided.
- We assume a combined total of 350 hours will be spent on review of annual reports and providing technical assistance to local governments throughout the year.
- The assumed hourly rate cost rate of $45/hour for staff time is based off salary and benefits for NCDEQ Environmental Program Consultant.

6.3.8 COSTS TO LOCAL GOVERNMENTS: NEUSE

There are fifteen local governments subject to the current Neuse Stormwater Rule. Each already has a local stormwater program and ordinance that they adopted and have been implementing per the requirements of the original rules. As a result of the proposed revisions to these rules each will need to amend and readopt their existing stormwater programs and ordinances to incorporate the revisions in the rules. Since there only a limited number of revisions that will require incorporation into the existing program documents this will require a minimum amount of local government staff time. The process will be further aided with assistance from the Division on draft language that incorporates the necessary changes.

Each local government already subject to the current rules will have six months to update their programs and submit them to the Division for approval. This extended period of time is provided to allow for back and forth between local governments and the Divisions and recognizing that in some cases local governments need to bring their updated programs and ordinances to the respective city council and county commissioners for final approval.

In addition to the communities already subject to the rules, there are also sixteen additional local governments proposed to be added to the Neuse Rule. The local governments for these communities will be required to develop, adopt and implement stormwater ordinances to control nutrient loading. Since these communities will be brand new to the rule requirements the process is anticipated to take longer and as a result they are provided a full year to develop and submit their local programs to the Division for approval. This process will also by aided with assistance from the Division on draft language to use in their programs and ordinances to incorporate the rule requirements. These costs are summarized in Table 6-14 below.

TABLE 6-14 COSTS TO LOCAL GOVERNMENTS: NEUSE BASIN

Program	Number of Local Governments	Develop & Update Local Stormwater Programs (One-time)	Record Keeping & Annual Reports (10 year NPV)	Inspections & Enforcement (10 year NPV)	Development Costs (10 year NPV)
Neuse Current	15	$69,000	$0	$555,499 -$1,735,606	$2.2M ($130K) – $6.9M
Neuse New	16	$184,000	$846,584	$0	$157K ($1.1M) – $2.7M

Model Program Development & Updates – One-time Costs

To implement the rule requirements each subject local government will need to draft and adopt local programs and ordinances to implement the nutrient loading requirements of this rule. The Division will provide local governments with a model program and ordinances to assist in this process. Local governments that are already subject to the rules will need to update their programs and ordinance and will have six months to do so and submit them to the EMC for approval while newly added communities will be given a full year to develop and submit their local programs for approval.

Quantification Method

To determine the costs for updating or developing local government stormwater programs it is assumed that local governments already subject to the rules would only need to invest a minimal amount of time of 40 hours to revise and adopt updated local programs since they already have programs in place to start from.

The local governments added to the rule will understandable need more time to develop new programs and ordinances. We assume they will need approximately 100 hours to develop and prepare to take their programs and ordinances through local approval processes.

We did so recognizing significant variability in the approval processes and the resources available internally to develop regulations. To simplify the calculation, we assume an average hourly rate of $115 per hour, based on input from the City of Durham and personal communication with stormwater consultants that have done similar work under the Falls Lake Rules. In some cases, current local government staff may do this work as part of their current work responsibilities at reduced cost to the local governments since the hourly rate for consultants is generally much higher.

Other factors could influence reductions in local government costs as well. One scenario could involve sharing of ordinance text among local governments with similar ordinance frameworks, which could significantly reduce total cost from the approach assumed here. Also, the Division will provide a model program and ordinance that local governments can use to develop their own local programs. This can result in significant time and costs savings for this task.

Assumptions

1. Developing and adopting a local stormwater program and local ordinance is a onetime cost.
2. As noted in the description above, we assume that Division staff will provide a model ordinance, reducing local time demands.
3. We also assume that each local government already has stormwater staff or other staff, or a contractor to draft and amend ordinances and take them through approval processes as part of their ongoing job responsibilities.
4. We assume an average $115/ hour rate for staff to do the necessary work to draft and amend the ordinances and take them through the approval process. This rate is assumed to cover salary, overhead costs, and fringe benefits.

Record Keeping and Annual Reporting

Under the rules local governments are responsible for tracking development projects and developing annual reports to submit to the Division. All of the local governments subject to the current Neuse rules already perform this recordkeeping and annual reporting so the revised rules do not result in any new costs for this task. For all of the of the proposed Neuse local governments this annual reporting element would represent a new cost in addition to any annual reporting they are already required to do under any of their existing stormwater programs. This rule would not impose specific monitoring requirements outside of inspections, which are covered separately below. Recordkeeping would be needed to track development projects and enforcement cases, and to develop and submit annual reports to the Division.

Assumptions

- Based on input from local governments we assume each local government will spend 75 hours a year on record keeping and developing their annual reports.

Inspection and Enforcement

Under the rule requirements local governments will inspect new development sites for compliance with permitted construction designs and audit a portion of all existing sites for reporting accuracy

Assumptions

1. We assume an average of $360 per SCM (based on input from City of Durham)
2. We assume the unit cost includes staff time and associated travel costs to perform inspections.

Local Government Development Compliance Costs

In addition to administering the requirements of the Neuse Stormwater Rules on private parties, Local governments also conduct building activities that are required to comply with the substantive requirements rules. These Local government building projects can differ in nature from the types we have identified for developers, but we did not attempt to characterize those activities. Instead we assumed them to be similar in loading character to municipal residential and commercial/industrial development. We estimated the fraction of all new development that would be conducted by local governments the basin and used that fraction of the developer cost totals as those associated with local government building.

Quantification method

The fraction of development offset payments made by Neuse local governments to private nutrient offset banks and the NC Division of Mitigation Services over the last three years (August 2015 through August 2018) was used to estimate the portion of all new development that is conducted by local governments. A review of nutrient offset ledgers shows that Neuse local governments made 62 of the 761 offset payments in the Neuse over that time period. That is 8.1% off all payments. That percentage was then applied to the development costs estimates in Chapter 6 for municipal residential and commercial/industrial development, as the development types closest in type and loading nature to local government projects. The costs in Table 6-14 include the total capital, planning, regulatory transaction, and operation and maintenance cost for the 8.1% of all development attributed to local governments.

6.4 TAR-PAMLICO STORMWATER RULE REQUIREMENTS

The Tar-Pam New Development Stormwater Rule (15A NCAC 02B .0258) is structured and implemented in a similar fashion as the Neuse rule. However, in the Tar-Pamlico River Basin both nitrogen and phosphorus were identified as nutrients of concern in the TMDL so the Tar-Pam nutrient management strategy includes a phosphorus reduction goal in addition to nitrogen goal.

The Tar-Pam New Development Stormwater Rule establishes a set of objectives for reducing nitrogen and phosphorus runoff from new development projects within the planning and zoning jurisdictions of eleven local governments in the basin. Under the requirements of the rule, the nutrient export goal for new development projects is limited to a total nitrogen (TN) export of 4.0 lbs TN/acre/yr and phosphorus (TP) export of 0.4 lbs TP/acre/yr. These export targets represent the nutrient strategy's overall 30% reduction goal applied to lands subject to new development. It represents a 30% reduction from the average pre-development loading conditions.

Under the current rule, the nitrogen and phosphorus export targets may be achieved by developers through a combination of site design,on-site SCMs and nutrient offsets purchased from a Division-approved offset program. If the untreated nitrogen export for a planned project is calculated to be greater than 6.0 lbs/ac/yr for residential, or 10.0 lbs/ac/yr for commercial/industrial/multi-family development, the developer must first implement onsite SCMs to lower the site export to at least those levels before being allowed to "buy down" the remainder of their nutrient exports to the rule-required 4.0 lbs/ac/yr nitrogen and 0.4 lbs/ac/yr phosphorus targets using offsite offsets.

As of 2006, each of the eleven local governments subject to the Tar-Pamlico Stormwater Rule adopted and implemented their local permitting programs requiring new development projects to control stormwater runoff. Upon implementation, local governments were required to submit annual reports to the Division.

6.4.1 PROPOSED REVISIONS TO THE TAR-PAMLICO NEW DEVELOPMENT STORMWATER RULE

As with the revisions to the Neuse Stormwater Rule discussed in Section 6.2.1 of this analysis, the proposed revisions to the Tar-Pamlico Stormwater Rule include three provisions that may result in additional costs and/or cost savings for developers. These proposed revisions are described below and include additional basin specific information to explain where the Tar-Pam rule revisions may differ slightly from those propose in the Neuse rule.

6.4.1.1 ADDITION OF OTHER LOCAL GOVERNMENTS TO THE RULE

Three local governments are proposed to be added to the eleven currently subject to the Rule. This would address two related interests. After two decades of implementation, the legislative directive to restore nutrient-impaired waters remains unmet in the Tar-Pamlico estuary. In the intervening period, population a few communities not subject to the rule have expanded greatly and continue to do so. It is reasonable to expect that this substantial, ongoing growth is a significant source of nutrients to the estuary and thus appropriate to address toward the regulatory objective of the strategy. Application by staff of similar inclusion criteria to those used during the original rulemaking points to the addition of these jurisdictions to the rule. Thus, these additions are also suggested in the interest of making this rule current as part of the periodic review process.

TABLE 6-15 POPULATION GROWTH OF PROPOSED COMMUNITIES: TAR-PAM (2000-2010)

Local Government	Pop Census 2000	Pop Census 2010	Annual Population Growth (2000-2010)
Granville County	13,491	16,548	306
Vance County	17,495	19,355	186
Wilson County	7,292	16,932	71

Source: US Census Data for 2000 and 2010

Annual population growth data for the proposed communities is provided Table 6-15. Populations shown above are only include the population located within the portion of the municipality or county within the Neuse watershed and were obtained from the 2000 and 2010 population census[80]. Only municipalities and counties with populations of at least 5,000 and 20,000 people, respectively, were considered. Of those local governments that met that initial criteria only those with annual growth rates of approximately 200 people per year or greater over the 2000 – 2010 time period were proposed to be added to the rule. Wilson County is split between the Neuse and Tar-Pamlico River Basins with approximately 80% of the basin within the Neuse and 19% within the Tar-Pamlico Basin. Given the counties' ongoing population growth as a whole, and the fact that the Neuse portion of Wilson County is being proposed to be added to the Neuse Rule, the remaining portion of the county is proposed to be added to the Tar-Pamlico rule here.

Fewer local governments are proposed to be added to the rule in the Tar-Pam than the Neuse because of the lower population growth in the less urbanizing Tar-Pamlico Basin. The current Tar-Pam stormwater rule includes five counties and 6 municipalities making up 45% of the land area in Tar-Pam River Basin. The addition of three

[80] U.S. Census Bureau. (2000 & 2010). Retrieved From https://www.census.gov/topics/population.html

proposed local governments covers another 7%. Adding these communities and increasing the area required to meet stormwater post-construction nutrient export targets will result in additional reductions in nutrient inputs into the Tar-Pamlico Estuary. The full list of local governments currently subject to the rule and those being proposed is provided in Table 6-16.

TABLE 6-16 CURRENT & PROPOSED ADDITIONAL LOCAL GOVERNMENTS SUBJECT TO RULE TAR-PAM STORMWATER RULE

Currently Subject to Rule		Proposed Additions to Rule	
Municipalities	**Counties**	**Municipalities**	**Counties**
Oxford	Franklin County	-	Granville County
Henderson	Nash County	-	Vance County
Rocky Mount	Edgecombe County	-	Wilson County
Tarboro	Pitt County	-	-
Greenville	Beaufort	-	-
Washington		-	-

6.4.1.2 REVISION OF ONSITE TREATMENT REQUIREMENTS

The most significant technical change proposed is replacement of the threshold approach for determining onsite treatment requirements described above to a more direct requirement for a primary SCM at or above 24% built-upon area (BUA). This change is needed to address an unintended gap in control requirements. It would update the rule based on implementation experience and adapt it to the intervening evolution of other state stormwater programs.

The current onsite treatment thresholds of 6 lbs TN/ac/yr for residential and 10 lbs TN/ac/yr for commercial/industrial development projects equate to approximately 36% BUA and 57% BUA respectively as estimated with current tools. These unintentionally loose offsite thresholds, combined with what became established as the comparatively low cost of the prevailing offsite offset option, has resulted in virtually exclusive use of the offsite option by any development below the thresholds. While the offsite option was desired and intentional in the original rule as a cost-effective outlet above certain intensities to provide an alternative to the use of more than one BMP per catchment, the intent was also to require treatment by at least one SCM on most development to provide not only general water quality protection for receiving waters, but also protection of those receiving streams from the destructive hydrologic impacts of uncontrolled stormwater runoff produced by graded, paved, and piped or channelized developed lands. Ironically, the thresholds chosen resulted in fewer developments installing stormwater controls than in areas not subject to the rule but subject to other state stormwater regulations. NPDES stormwater regulations for general water quality protection purposes, as well as most levels of Water Supply Watershed protection and Coastal Stormwater rules use the density-based approach of requiring an SCM at and above 24% BUA. Thus, development in the many Tar-Pamlico communities not subject to the Tar-Pamlico stormwater rule but subject to these other rules currently faces more stringent onsite requirements than does development in Tar-Pamlico rule communities.

Regarding the currently subject Tar-Pamlico communities, in those where NPDES stormwater rules also apply, those rules defer to the Tar-Pamlico requirements as satisfying NPDES, which effectively maintains the unintended gap.

6.4.1.3 REPLACEMENT OF CURRENT NUTRIENT LOAD ESTIMATORS WITH THE SNAP TOOL

Under the proposed rule, use of the Stormwater Nitrogen and Phosphorus Tool (SNAP) or its successor is required for calculating runoff nutrient loads and SCM load reductions to determine any offset needs and demonstrate rule compliance. The SNAP tool calculates nutrient load reductions by all SCMs for which Minimum Design Criteria rules have been approved by the EMC. Its credit calculations are detailed in the DEMLR document *North Carolina Stormwater Control Measure Credit Document (NCDEMLR 2017).* SNAP will become the single stormwater compliance tool as regulations allow.

SNAP will replace the much simpler, weighted export coefficients method used in the Tar-Pamlico method, which was the first NC use of the same core calculation used in SNAP. The Neuse and Tar-Pamlico tools produce very similar results and provide the same SCM credit rates. Thus, for simplicity this analysis will rely exclusively on the Tar-Pamlico method to quantify baseline conditions for both Neuse and Tar-Pamlico rules.

6.5 COST ANALYSIS, TAR-PAMLICO STORMWATER RULE

6.5.1 ANALYTICAL APPROACH – OVERVIEW

To develop estimates of costs and cost savings related to the proposed rule revisions calculations were developed for both "current programs" (those local governments already subject to the Tar-Pamlico Rule) and "new programs" (the 3 additional local governments proposed to be added to the rule). This analysis was done in concert with the Neuse rule analysis and used the same approach. Please see Section 6.3.1 for an explanation.

6.5.2 CURRENT TAR-PAMLICO LOCAL GOVERNMENTS' REGULATORY BASELINE

Please see Section 6.3.2 for a full explanation of the relationships among stormwater programs. As show in Table 6-17 below, current Tar-Pamlico local governments implement the Tar stormwater rule and potentially one or more other stormwater regulations in portions of their jurisdictions. In All eleven local governments subject to the current rule, developments are required to install 1 SCM when the untreated export rate exceeds 6 lbs/ac/yr for residential and 10 lbs/ac/yr for commercial, and to offset the remainder to meet 4.0 lbs/ac/yr TN and 0.4 lbs/ac/yr TP targets.

TABLE 6-17 BASELINE TAR-PAMLICO STORMWATER PROGRAM COVERAGE

Local Governments	NSW	Phase II	WSW	Coastal	ORW/HQW
Oxford	x				
Henderson	x	x			x
Rocky Mount	x	x	x		
Tarboro	x		x		
Greenville	x		x		
Washington	x			x	
Franklin County	x				
Nash County	x		x		
Edgecombe County	x	x			
Pitt County	x	x	x		
Beaufort County	x			x	

Legend: NSW - Nutrient Sensitive Waters; the Neuse New Development Stormwater rule
Phase II - Federal Clean Water Act NPDES Stormwater
WSW - Water Supply Watershed
ORW/HQW - Outstanding Resource Waters/High Quality Waters

6.5.3 PROPOSED TAR-PAMLICO LOCAL GOVERNMENTS REGULATORY BASELINE

The three local governments proposed to be added under the revised rule currently do not require any treatment of post-construction stormwater runoff (Table 6-18). While a portion of each county is subject to water supply watershed stormwater rules, the portion of each subject to those requirements is located outside of the Tar-Pamlico River Basin.

TABLE 6-18 BASELINE STORMWATER COVERAGE FOR PROPOSED TAR-PAMLICO LOCAL GOVERNMENTS

Local Governments	NSW	Phase II	WSW	Coastal	ORW/HQW
Granville County			x		
Vance County			x		
Wilson County			x		

Legend: NSW - Nutrient Sensitive Waters; the Neuse New Development Stormwater rule
Phase II - Federal Clean Water Act NPDES Stormwater
WSW - Water Supply Watershed
ORW/HQW - Outstanding Resource Waters/High Quality Waters

TABLE 6-19 REQUIREMENTS FOR STATE-MANDATED STORMWATER PROGRAMS, TAR-PAMLICO RIVER BASIN

Requirement **(Based on Classification)**	WS-II BW	WS-III BW	WS-IV PA	Phase II	Tar-Pamlico NSW
Permitting Authority	Local Gov't	Local Gov't	Local Gov't	Local Gov't	Local Gov't
Low Density Max. BUA **(1)**	12%	24%	24%	24%	N/A
High Density Max BUA **(2)**	30%	50%	70%	None	N/A
Low Density Setback (2.5)	30'	30'	30'	30'	50' RB
High Density Setback (2.5)	100'	100'	100'	30'	50' RB
S/W Control Req. for High Density **(3)**	1" R/O	1" R/O	1" R/O	1" R/O	1" R/O
TSS Removal Requirement	85%	85%	85%	85%	85%
Stormwater Drawdown **(4)**	Note 4	Note 4	Note 4	Note 4	Note 4
Flow Control Req.	No	No	No	1-yr 24-hr peak match	1-yr 24-hr peak match
Vegetated Conveyances for Low Density **(5)**	Yes	Yes	Yes	Yes	N/A
Deed/Property Restrictions Required **(6)**	Yes	Yes	Yes	Yes	N/A
Cluster Dev. Allowed **(7)**	Yes	Yes	Yes	Yes	N/A
10/70 Provision Allowed **(8)**	Yes	Yes	Yes	No	N/A
NSW Load Limits **(10)**	No	No	No	No	3.6 lb N/ac/yr

Legend: BUA – Built-Upon Area; BW – Balance of Watershed outside Critical Area; N – Nitrogen; NSW – Nutrient Sensitive Waters, P – Phosphorus; PA – Protected Area; RB – Riparian Buffer; R/O – Runoff; S/W – Stormwater; TSS – Total Suspended Solids, WS – Water Supply watershed

6.5.4 DETAILED ANALYTICAL APPROACH

Again, the same approach applied to the Neuse was used for the Tar-Pamlico. For explanation of those methods, please see Section 6.3.4. Results are presented here with any noteworthy specifics discussed.

Step 1: Acres per Year of New Development

Staff used GIS analysis to compare the 2001 and 2011 National Land Cover Database datasets to develop estimates of the annual acres of development for both the current and new communities. Since some local governments are located within multiple watersheds, this approach made it possible to develop growth estimates for just the area of the local government located within the Neuse River Basin. Development acres were aggregated into three development types determined by the percent built-upon area (BUA):

1. County Residential (0-20% BUA)
2. Municipal Residential (20-50%BUA)
3. Commercial & Industrial (50-90% BUA)

TABLE 6-20 ESTIMATED RATE OF NEW DEVELOPMENT IN TAR-PAMLICO BASIN JURISDICITONS

Tar-Pamlico Basin	Current Communities	New Communities
Development Type	**Acres Developed**	**Acres Developed**
County Residential	81 acres/yr	35 acres/yr
Municipal Residential	415 acres/yr	27 acres/yr
Commercial / Industrial	69 acres/yr	5 acres/yr

As stated above, staff chose to compare developed acres over the most recent 10-year time span of NLCD land cover data (2001-2011) available as a predictor of future rate of development. Ten years was assumed to provide a reasonable average predictor of annual growth rate going forward. A limitation of this data is that dataset availability resulted in a growth rate period ranging from 7 to 17 years ago. Another, recognized uncertainty in the NLCD data is its pixel resolution of 30 meters. It is speculated that this factor on average may lead to underestimates of impervious acres, where e.g. narrow bands of pavement are surrounded by pervious cover as with some driveways and roads, but this type of error is more likely also at the low end of development intensity, which will be shown to have minimal effect on the cost outcomes.

Step 2: Unit-Area Loading Rates for Development Acres

Each of the three development types was assigned a range of untreated unit-area loading rates in pounds per acre per year based on the range of impervious percentage it covers. For the baseline condition, the current method, the Tar-Pamlico Stormwater Tool was used while as called for in the proposed rule, the SNAP tool was used for the proposed condition. Nutrient export ranges were produced for each development category by performing multiple scenario runs of both tools using low-and high-end built-upon area mixtures. Unit-area loading rate results are summarized in Tables 6-21 and 6-22 below.

TABLE 6-21 DEVELOPMENT UNIT-AREA LOADING RATES, BASELINE (TAR-PAMLICO STORMWATER TOOL)

Treatment Condition	Municipal Residential				Commercial / Industrial			
	Nitrogen (lbs/ac/yr)		Phosphorus (lbs/ac/yr)		Nitrogen (lbs/ac/yr)		Phosphorus (lbs/ac/yr)	
	Low	High	Low	High	Low	High	Low	High
Untreated	3.5	8.5	0..53	0.99	8.5	15.6	0.99	1.65
Most Likely Mix: Wet Pond/Wetland/Bioretention	2.4	5.9	0.32	0.60	5.9	10.7	0.60	1.01

TABLE 6-22 DEVELOPMENT UNIT-AREA LOADING RATES, PROPOSED RULE (SNAP TOOL)

Treatment Condition	Municipal Residential				Commercial / Industrial			
	Nitrogen (lbs/ac/yr)		Phosphorus (lbs/ac/yr)		Nitrogen (lbs/ac/yr)		Phosphorus (lbs/ac/yr)	
	Low	High	Low	High	Low	High	Low	High
Untreated	3.5	7.0	0.77	1.15	7.0	11.6	1.15	1.65
Bioretention	1.1	2.2	0.22	0.43	2.2	3.7	0.43	0.71
Most Likely Mix: Wet Pond/Wetland/Bioretention	2.3	4.4	0.4	0.6	4.4	7.4	0.6	1.0
Low-Cost Pair: Wetland/Infiltration*	0.8 -1.6	1.4 - 3.1	0.12 - 0.3	0.15 - 0.5	1.4 - 3.1	2.3 - 5.0	0.15 - 0.5	0.21 - 0.8

** = Range of unit area loading rates provided for Wetland/Infiltration to reflect the different weighting of SCM use in the Piedmont and Coastal Plain.*

Step 3: Estimate SCM Needs

The untreated nitrogen export ranges provided above were used to estimate the fraction of development acres that would require treatment by an SCM under the proposed rule that does not under the baseline condition.

Separate calculations were performed for the current programs and new programs because of their different baseline conditions as described above. The results of this analysis are presented in Table 6-23 below. Detailed calculations tables for this analysis are provided in the Appendix. For a discussion covering the logic behind this step see the earlier discussion provided in the Neuse Stormwater Rule Section.

Step 4: Estimate Nutrient Offset Needs

Analysis continued by development type for both the baseline condition and the proposed rule, which again were compared. Treated loading rates were compared against the rule rate target of 4.0 lb TN/ac/yr and 0.4 lb TP/ac/yr to estimate any remaining reduction needs, which would be addressed via offset payment. Detailed calculation tables for this analysis are provided in the Appendix. For a discussion covering the logic behind this step see the Neuse discussion provided in Section 6.3.4.

TABLE 6-23 ADDITIONAL SCM & OFFSETS NEEDED: TAR-PAM CURRENT & NEW PROGRAMS

	Tar-Pam Current				Tar-Pam New			
	Muni Residential		Commercial Industrial		Muni Residential		Commercial Industrial	
Total Annual Development Acres (ac/yr)	415		69		27		5	
Net Increase in Treatment: New/Existing Acres	**New**	**Existing**	**New**	**Existing**	**New**	**Existing**	**New**	**Existing**
New/Existing Fractions Needing SCM	49%	51%	21%	79%	100%	0%	100%	0%
New/Existing Acres Needing SCM (ac/yr)	205	210	14	55	27	0	5	0
Net New Offsets: All Development Acres	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**
Most Likely SCMs Mix - Per Acre Offset Need (lb/ac/yr)	-.092	-.26	-2.70	-0.36	0.23	0	2.61	0.09
Most Likely SCMs Mix - Total Offset Need (lb/yr)	-380	-107	-187	-24	6	0	13	0
Hi End-All BR - Per Acre Offset Need (lb/ac/yr)	-1.14	-.26	-5.32	-.045	0	0	0	0
Hi End-All BR - Total Offset Need (lb/yr)	-475	-107	-367	-31	0	0	0	0
Low End Pair - Per Acre Offset Need (lb/ac/yr)	-1.14	-.26	-4.32	-0.38	0	0	0.20	0.01
Low End Pair - Total Offset Need (lb/yr)	-472	-107	-298	-26	0	0	1	0

The net reductions in nutrient offsets needed under current programs in both basins under the proposed rule is the result of two factors. The first and the largest factor, the proposed rule requires one SCM for all development projects with over 24% built-upon area. As described earlier, the intent of this requirement is to close an unintended gap in onsite treatment requirements that exists in current Neuse and Tar-Pamlico programs, with the specific objective of requiring more stormwater treatment onsite. The companion outcome is of course reduced need for offsite offset credits. New programs do not have this gap, resulting in some amount of positive offset need in both basins.

The second factor contributing to reduced offset needs in current programs is that advances in the scientific understanding of SCM nutrient removal function in general, as incorporated in the new SNAP tool, have coincidentally resulted in generally greater unit load reduction credits for SCMs, largely as a result of shifting away from the conventional, fixed reduction efficiency approach to SCM performance accounting and to the fixed effluent concentration model to account for performance variability. The high absolute nitrogen reduction efficiency of bioretention in particular will allow developments using this more costly option to fully meet nitrogen loading targets onsite across the range of development intensities without needing offsets.

The positive offset requirement for new programs results from the "most likely" SCMs and low-end cost SCMs not achieving the rate targets on higher intensity developments, combined with the lack of existing stormwater nutrient requirements that the proposed rule would otherwise be compared against.

6.5.5 CALCULATION ASSUMPTIONS

Assumptions in Tar-Pamlico calculations are the same as those provided in the Neuse Analysis. These assumptions are presented in Section 6.3.5 of this chapter.

6.5.6 PRIVATE ENTITY COSTS & COST SAVINGS

Developer costs and cost savings under the rule for ten years' worth of implementation, presented in net present value, are summarized in Tables 6-24 and 6-25 below. SCM Installation costs include the planning, construction, land value, and regulatory transaction costs for installing an SCM. The "most likely" costs result from the SCM scenario of that name as described in Step 4 of the calculations in Section 6.3.5 above. The "most likely" scenario assumed continued use of the three currently used SCMs - wet ponds, wetlands and bioretention - and their proportions. The range reflects at the low-cost end, the Coastal Plain/Piedmont split use of wetlands and infiltration, and at the high-cost end, use of bioretention everywhere.

The current Nutrient Offset rule provides nutrient offset credit for 30 years so when the nutrient offset need for a development is calculated, the annual offset need is multiplied by 30 so the full 30 years of offset credits are purchased upfront when the development goes into place. The net total offset pounds presented in Table 6-9 do not include the 30-year multiplier. However, the 30-year multiplier is applied to these offset estimates in the offset cost calculations in order to capture the true offset cost under the current rule.

Under the proposed rule changes, developers will be required to secure permanent offset credits. As described in Section 5.3.1 of the Nutrient Offset Rule analysis, because all recent offset projects are protected by permanent conservation easements and future projects of the same type will be eligible for permanent credit, this change is not expected to result in changes to the overall cost of offset credit needed for a development project.

As show in Tables 6-24, for current communities the proposed revisions to the rule would result in an overall increase in SCM needs and a decrease in nitrogen and phosphorus offset needs resulting in a combined net cost increase of approximately $8.6 million over 10 years of implementation in net present value terms. Given that new communities currently have no stormwater requirements, this is the one case that illustrates the full cost of the rule's requirements. Table 6-25 shows the range of cost options. An explanation of the drivers for these results is covered under the Neuse analysis at Section 6.3.6.

TABLE 6-24 SUMMARY OF DEVELOPER COSTS, CURRENT TAR-PAMLICO COMMUNITIES (10 YEARS NPV)

Development Type / Cost		SCM	O&M	N Offset	P Offset
Municipal Residential	Most Likely	$10.65M	$590K	($551K)	($2.21M)
	Range	$10.65M - $23.40M	$183K - $1.64M	($551K) – ($689K)	($2.21M) – ($2.21M)
Commercial Residential	Most Likely	$850K	$40K	($271K)	($496K)
	Range	($464K) - $3.37M	($28K) - $214K	($271K) – ($532K)	($496K) – ($640K)
Total (NPV)	Most Likely	$11.50M	$630K	($822K)	($2.71M)
	Range	$10.30M - $26.77M	$630K - $1.8M	($822M) – ($1.22M)	($2.72M) – ($2.85M)
Grand Total (NPV)	Most Likely	**$8.60M**			
	Range	**$6.59 – $24.56M**			

TABLE 6-25 SUMMARY DEVELOPER OF COSTS, NEW TAR-PAMLICO COMMUNITIES (10 YEARS NPV)

Development Type / Cost		SCM	SCM O&M	N Offset	P Offset
Municipal Residential	Most Likely	$1.31M	$65K	$9K	$0
	Range	$947K - $2.07M	480K - $122K	$0 - $9K	$0
Commercial Residential	Most Likely	$286K	$12K	$20K	$0
	Range	$225K - $451K	$9K - $23K	$0 - $20K	$0
Total (NPV)	Most Likely	$1.59M	$77K	$29K	$0
	Range	$1.17M - $2.52M	$57K - $145K	$0 - $29K	$0
Grand Total (NPV)	Most Likely	**$1.70M**			
	Range	**$1.23M - $2.67M**			

6.5.7 COSTS TO STATE GOVERNMENT

Under the proposed rule the Division is responsible for developing and providing guidance for local program development, accounting methods and expectations, review and approve local program proposals, including ordinances, provide guidance to implementing local governments, review annual implementation reports submitted by local governments, and performing compliance oversight on local programs. These activities can be combined into three distinct task categories:

1. Developing Model Program & Ordinance
2. Reviewing Local Government Programs
3. Annual Report Review and Technical Assistance

These activities are already being implemented by state staff for the current local governments, so they do not represent new costs. However, as a result of the proposed revisions to these rules the state will need to make minor modifications to the current model program and ordinance, so they can be used as guidance by local governments to modify their local programs. The added communities will also need to use the updated model program and ordinance to develop their own local programs to aid in the implementation of the rule requirements.

Model Program Revisions and Local Program Approval

Since there are only a limited number of revisions that will require incorporation into the existing model program documents it will not take a significant amount of time for staff to make the revisions. However, staff will also need to review and approve both the 11 revised local programs and 3 new local programs submitted by the local governments. Because of the small number of revisions, it is not anticipated that review of the revised local programs will require as much staff time as in the Neuse. However, the review of the 3 new local government programs will likely take longer. The associated opportunity cost for the task of updating the model program and reviewing local government programs is provided in Table 6-26 below.

Annual Report Review & Technical Assistance

Local governments subject to the rule must submit an annual report to the Division each year to report on development activities within their jurisdiction and their progress in implementing the rule requirements. Division

staff is tasked with reviewing these reports and providing technical assistance to local governments when question arise regarding implementation of the rules. This work is already completed on an annual basis by current staff for the 11 local governments subject to the current rule. Review of reports from the 3 new local governments would be done by the same staff but represents an opportunity costs. The associated opportunity cost for reviewing the annual reports of from the 3 new communities is provided in Table 6-27 below.

TABLE 6-26 STATE GOVERNMENT COSTS

Task	One-time Cost	Total Cost (10 years NPV)
Update Model Program & Ordinance	$13,500	-
Review & Approve Local Programs	$15,750	-
Review Annual Report & Provide Technical Assistance	-	$55,212

Assumptions

- We assume updates to the current model program guidance document and model ordinance can be completed by current staff in 300 hours.
- We assume the model program update and review of local programs is a one-time cost.
- We assume 350 hours of total staff time to review all revised and new local government programs which will allow for any necessary back and forth on revisions.
- Annual report review and technical assistance are assumed to be annual costs so both an annual and NPV cost estimate are provided.
- We assume a combined total of 200 hours will be spent on review of annual reports and providing technical assistance to local governments throughout the year.
- The assumed hourly rate cost rate of $45/hour for staff time is based off salary and benefits for NCDEQ Environmental Program Consultant.

6.5.8 COSTS TO LOCAL GOVERNMENTS: TAR-PAMLICO

There are eleven local governments subject to the current Tar-Pamlico Stormwater Rule. Each already has a local stormwater program and ordinance that they adopted and have been implementing per the requirements of the original rules. As a result of the proposed revisions to these rules each will need to amend and readopt their existing stormwater programs and ordinances to incorporate the revisions in the rules. Since there only a limited number of revisions that will require incorporation into the existing program documents this will require a minimum amount of local government staff time. The process will be further aided with assistance from the Division on draft language that incorporates the necessary changes.

Each local government already subject to the current rules will have six months to update their programs and submit them to the Division for approval. This extended period of time is provided to allow for back and forth between local governments and the Divisions and recognizing that in some cases local governments need to bring their updated programs and ordinances to the respective city council and county commissioners for final approval.

In addition to the communities already subject to the rules, there are also three additional local governments proposed to be added to the Tar-Pamlico Rule. The local governments for these communities will be required to develop, adopt and implement stormwater ordinances to control nutrient loading. Since these communities will be brand new to the rule requirements the process is anticipated to take longer and as a result they are provided a full year to develop and submit their local programs to the Division for approval. This process will also by aided

with assistance from the Division on draft language to use in their programs and ordinances to incorporate the rule requirements. These costs are summarized in Table 6-27.

TABLE 6-24 LOCAL GOVERNMENT COSTS: TAR-PAMLICO

Program	Number of Local Governments	Develop & Update Local Stormwater Programs (One-time)	Record Keeping & Annual Reports (10 year NPV)	Inspections & Enforcement (10 year NPV)	Development Costs (10 year NPV)
Tar-Pamlico Current	11	$50,600	$0	$137,014 -$569,009	$365K $316K - $1.2M
Tar-Pamlico New	3	$34,500	$158,735	$26,988 – $83,143	$81K $62K– $134K

Model Program Development & Updates: One-time Costs

To implement the rule requirements, each subject local government will need to draft and adopt local programs and ordinances to implement the nutrient loading requirements of this rule. The Division will provide local governments with a model program and ordinances to assist in this process. Local governments that are already subject to the rules will need to update their programs and ordinance and will have six months to do so and submit them to the EMC for approval while newly added communities will be given a full year to develop and submit their local programs for approval.

Quantification Method

To determine the costs for updating or developing local government stormwater programs it is assumed that local governments already subject to the rules would only need to invest a minimal amount of time of 40 hours to revise and adopt updated local programs since they already have programs in place to start from.

The local governments added to the rule will understandable need more time to develop new programs and ordinances. We assume they will need approximately 100 hours to develop and prepare to take their programs and ordinances through local approval processes.

We did so recognizing significant variability in the approval processes and the resources available internally to develop regulations. To simplify the calculation, we assume an average hourly rate of $115 per hour, based on input from the City of Durham and personal communication with stormwater consultants that have done similar work under the Falls Lake Rules. In some cases, current local government staff may do this work as part of their current work responsibilities at reduced cost to the local governments since the hourly rate for consultants is generally much higher.

Other factors could influence reductions in local government costs as well. One scenario could involve sharing of ordinance text among local governments with similar ordinance frameworks, which could significantly reduce total cost from the approach assumed here. Also, the Division will provide a model program and ordinance that local governments can use to develop their own local programs. This can result in significant time and costs savings for this task.

Assumptions

1. Developing and adopting a local stormwater program and local ordinance is a onetime cost.
2. As noted in the description above, we assume that Division staff will provide a model ordinance, reducing local time demands.
3. We also assume that each local government already has stormwater staff or other staff, or a contractor to draft and amend ordinances and take them through approval processes as part of their ongoing job responsibilities.
4. We assume an average $115/ hour rate for staff to do the necessary work to draft and amend the ordinances and take them through the approval process. This rate is assumed to cover salary, overhead costs, and fringe benefits.

Record Keeping and Annual Reporting

Under the rules local governments are responsible for tracking development projects and developing annual reports to submit to the Division. All of the local governments subject to the current Tar-Pamlico stormwater rules already perform this recordkeeping and annual reporting so the revised rules do not result in any new costs for this task. This rule would not impose specific monitoring requirements outside of inspections, which are covered separately below. Recordkeeping would be needed to track development projects and enforcement cases, and to develop and submit annual reports to the Division.

Assumptions

1. Based on input from local governments we assume each local government will spend 75 hours a year on record keeping and developing their annual reports.

Inspection and Enforcement

Under the rule requirements local governments will inspect new development sites for compliance with permitted construction designs and audit a portion of all existing sites for reporting accuracy

Assumptions

1. We assume an average of $360 per SCM (based on input from City of Durham)
2. We assume the unit cost includes staff time and associated travel costs to perform inspections.

Local Government Development Compliance Costs

In addition to administering the requirements of the Tar-Pamlico Stormwater Rules on private parties, Local governments also conduct building activities that are required to comply with the substantive requirements rules. These Local government building projects can differ in nature from the types we have identified for developers, but we did not attempt to characterize those activities. Instead we assumed them to be similar in loading character to municipal residential and commercial/industrial development. We estimated the fraction of all new development that would be conducted by the current local governments and used that fraction of the developer cost totals as those associated with local government building.

Quantification method

The fraction of development offset payments made by Tar-Pamlico local governments to private nutrient offset banks and the NC Division of Mitigation Services over the last three years (August 2015 through August 2018) was used to estimate the portion of all new development that is conducted by local governments. A review of nutrient offset ledgers shows that Tar-Pamlico local governments made 8 of the 167 offset payments in the Tar-Pam over that time period. That is 4.8% off all payments. That percentage was then applied to the development costs estimates in Chapter 6 for municipal residential and commercial/industrial development, as the development types closest in type and loading nature to local government projects. The costs in Table 6-27 include the total

capital, planning, regulatory transaction, and operation and maintenance cost for the 4.8% of all development attributed to local governments.

6.6 STORMWATER RULE BENEFITS

The proposed stormwater rules provide two types of water quality benefits. More apparent is the benefit of new reductions in nutrient (and other pollutant) loading relative to current conditions on newly subject lands, while considered by staff to be more important is a sizable set of hydrologic benefits stemming from provision of onsite treatment where it is not currently required. This hydrologic benefit accrues on both currently subject and newly subject lands. Also, to the extent that practice selection shifts more to bioretention or to less expensive infiltration, additional hydrologic and nutrient benefits would accrue. Wherever this discussion identifies nutrient reduction benefits, it should be recognized that other pollutant reduction benefits will accrue concurrently. This analysis will not attempt to characterize those other treatment benefits and the document will not elaborate further on them.

The general benefits of providing onsite stormwater quality control are well recognized. Capture, detention and treatment of stormwater yields not only significant reduction of pollutants including nutrients entering receiving waters, but importantly, reduction in both total volume and rates of runoff exiting developments. Development yields large increases in volume and velocity of runoff due to sloping and compacting of soil, addition of buildings, parking, streets and other impervious surfaces, and addition of runoff conveyances to the landscape. Unchecked development runoff, particularly in urban areas, can be expected to destabilize stream channels, resulting in ongoing export of streambank and streambed sediment and associated nutrients and other pollutants. Unstable streams result in water quality degradation, habitat loss and degradation, property loss, and accelerated sedimentation of downstream impoundments. In turn, streambank sediment loss from unstable reaches becomes another major source of nutrients that is directly conveyed to downstream receiving waters, exacerbating nutrient-driven impairments. Runoff capture and treatment helps mitigate the large increases in volume and velocity of runoff that can accompany development by infiltrating some and slowing down release of most of the rest.

To evaluate the range of possible hydrologic and nutrient benefits of the rule while recognizing that cost and other site factors play a role in SCM selection, staff developed estimates for three SCM scenarios – a “most likely” selection bracketed by high- and low-cost scenarios. The “most likely” SCM scenario is continuation of the current predominant practices - wet ponds, wetlands, and bioretention - in their current proportions. While bioretention is potentially suitable in any site setting, the high-cost bioretention scenario is included more to illustrate the projected cost/benefit that would be associated with this more environmentally and aesthetically preferable practice as a policy alternative than as a plausible outcome scenario. The low-cost SCM pair of infiltration and constructed wetlands may have more real potential should the relatively new (with respect to modernized MDC) infiltration practice gain popularity. The two practices are proportioned using basin acres of their respective suitable settings, approximated by the subject acreages of coastal and piedmont development in each basin.

Nutrient Loading Reductions

Under the proposed rule, development in current Neuse and Tar jurisdictions will not, on first review, generate net nutrient reductions since the same overall loading targets will be met as are being met now; only the mix of onsite and offsite practices will change. Closer review considering other factors, described further below, suggests there will be some net nutrient reduction.

In contrast, net nutrient reductions will clearly accrue under newly added local programs, as detailed in Tables 6-28 and 6-29 below:

- In new Tar-Pamlico programs, no stormwater controls are currently required, so all treatment will provide new nutrient reduction benefits.
- In new Neuse programs, given all jurisdictions currently require treatment per Phase II or other regulation, nutrient gains will consist of the net additional reductions required to meet the nitrogen rate target, whether onsite through use of bioretention or other more efficient practice, or by oversizing a practice, and/or through offsite offset.

In both basins, to the extent that practice selection shifts to the more effective treatment options, overtreatment can occur and would yield benefits beyond those provided by meeting the rate targets precisely with offsets. More detailed description of nutrient and hydrologic benefits is provided following the hydrologic benefits overview. Following those sections, adjustments are made based on two countervailing factors .

Hydrologic Benefits

Two types of hydrologic benefits are provided by SCMs – runoff elimination via infiltration/evapotranspiration and slowing of runoff via detention and controlled release. As summarized in Tables 6-28 and 6-29 and detailed in Appendix Table A-10, the great majority of both benefits projected for the proposed rules will occur under current programs; the rules will require treatment where they did not previously on a total of approximately 890 acres per year across the two basins. Current Neuse programs will account for 670 acres, and current Tar programs the other 220 acres, both as a result of closing the unintended regulatory gap described earlier. New Tar-Pamlico programs will reduce runoff on another 30 acres per year where no treatment is currently required.

The expanded set of SCM options and improved treatment credit captured in the SNAP tool may incentivize SCM choices that yield much greater hydrologic benefit than will continuation of the baseline SCM mix. To the extent that treatment shifts on net from one of the current SCMs to either bioretention or infiltration, substantially greater volumes of runoff will be wholly eliminated due to the combination of the smaller fraction of untreated overflow and greater fraction of infiltration bioretention provides compared to other stormwater treatment practices, or through the complete elimination of the water quality volume accomplished by the infiltration SCM.

A review of projected costs and benefits together prompts the question of why all development would not be likely to shift to the low-cost infiltration/wetland pair. The pair is less costly than the baseline SCM mix. Environmentally, it produces hydrologic benefits twice that of bioretention and an order of magnitude greater than the baseline SCM mix. Analysis and consultation with DEMLR staff suggest that there is some potential for shift to infiltration, but a large shift appears unlikely. Infiltration is a relatively new practice with recent DEMLR rule changes, and as practitioner experience builds, its use may increase. However, a significant site-specific limiting factor may be that low soil percolation rates necessitate significantly expanded practice footprints that may make it less desirable for site design reasons.

While bioretention was initially thought to have good potential for expanded use under the proposed rule given its markedly better nutrient performance than any other primary SCM, two factors were subsequently identified that work against its unmatched nutrient performance. First, its absolute per-acre treated cost was estimated to be the highest for primary SCMs other than sand filters. That observation combines with recognition that current offset credit rates from DMS and private banks are sufficiently low as to provide no disincentive to satisfying unmet nutrient needs via offset payment, weighing against significant expansion of bioretention's role absent other factors.

That said, since SCM choice on any development involves a complex set of considerations, and the proposed rule requirements and new accounting tool will introduce new decision factors, as indicated we provide benefit

estimates for three treatment scenarios to illustrate a hypothetical range of possible benefits.

Benefits: Most Likely Scenario - SCM Mix

The "most likely" SCM scenario assumes continuation of the three SCMs currently predominating, also referred to as "the baseline mix". This assumes approximately 82% of all acres are treated in both Coastal and Piedmont settings by wet ponds; in the Piedmont, another 10% of acres are treated by constructed wetlands and 8% of acres by bioretention (see Section 6.3.4, Step 4 and footnote 72 for derivation of these values).

As summarized in Table 6-28 below, across all communities, almost 9 million ft3/yr of runoff would be wholly eliminated, and an additional 39 million ft3/yr would be detained and released slowly through continued use of the baseline mix. All this improvement occurs on newly treated acres (most of it under current programs), since continuing the same SCM mix on already treated acres yields no changes. These large hydrologic improvements are considered the primary benefit of the proposed rule changes, and a shift to more effective treatment SCMs would produce even greater hydrologic benefits. Implementing the SMC mix, the nutrient reductions across all communities range between a total of 800 and 1,100 lbs/yr nitrogen and a modest phosphorus reduction of 15 lbs/yr. These reductions stem from current communities in both basins as well as the Tar-Pamlico new communities and from offsets required in Neuse new communities (which all already require treatment under other rules).

TABLE 6-28 RUNOFF AND NUTRIENT BENEFITS – MOST LIKELY SCM MIX

Program	Benefit Mechanism	Runoff Eliminated (ft3/yr)	Runoff Detained (ft3/yr)	Nitrogen Eliminated (lbs/yr)	Phosphorus Eliminated (lbs/yr)
Neuse Current	Runoff: SCM Mix, New Acres	6,438,320	28,415,006	523-559	0
Neuse New	Nutrients: Offsets, Already Treated Acres	0	0	131 -216	0
Tar-Pam Current	Runoff: SCM Mix, New Acres	2,137,886	9,435,389	162-182	0
Tar-Pam New	Runoff: SCM Mix, New Acres Nutrients: SCM Mix, New Acres	333,051	1,469,895	70	15

As discussed above, departures from the current SCM mix may not occur, but to the extent they do, the high-cost and low-cost scenarios both yield very large benefits. These benefits are presented in Table 6-29 below.

Benefits: High-end cost scenario: All Bioretention

High-end costs assuming bioretention everywhere are provided not to suggest that use of bioretention everywhere is a particularly plausible scenario under the proposed rules, but as the analysis has revealed, they are more useful perhaps for characterizing relative costs associated with a possible policy alternative that approximates Low Impact Development. The nutrient reductions and direct hydrologic benefits obtained as the return for those costs are outlined here.

TABLE 6-29 RUNOFF AND NUTRIENT BENEFITS – BIORETENTION AND LOW-COST SCM PAIR

Program	SCMs	Runoff Eliminated (ft3/yr)	Runoff Detained (ft3/yr)	Nitrogen Eliminated (lbs/yr)	Phosphorus Eliminated (lbs/yr)
Neuse Current	Bioretention	36,157,341	73,267,000	1,678 – 2,283	N/A
	SCM Pair	79,852,350	-47,580,667[a]	1,881 – 2,631	N/A
Neuse New	Bioretention	17,584,363	38,486,929	2,211	190
	SCM Pair	30,309,305	-33,217,105 [a]	2,297	354
Tar-Pam Current	Bioretention	9,543,181	18,938,082	555 - 749	N/A
	SCM Pair	11,541,381	-635,830 [a]	627 - 870	N/A
Tar-Pam New	Bioretention	716,140	1,263,776	130	21
	SCM Pair	1,279,582	156,582	149	27

Notes:

a: Negative values for detained runoff for the Low-End SCM Pair represent detention shifted to runoff eliminated by infiltration, all relative to the baseline SCM mix. Associated Runoff Eliminated values reflect this shift.

Use of bioretention across all communities in both basins would result in nitrogen reductions totaling between 4,570 – 5,373 lbs/yr, four- to five-fold greater than those estimated for the SCM mix in Table 6-28. Phosphorus reductions of approximately 210 lbs/yr would also be achieved, much greater than the small P benefit estimated for the SCM Mix.

Combined hydrologic benefits of bioretention for the combined 3,500 acres of development receiving treatment each year would amount to about 64 million ft3 of runoff totally eliminated, roughly 4 times greater than the most likely SCM mix, and an additional 132 million ft3 per year of slow-release runoff post-treatment, roughly 3 times more than the SCM mix and arguably more slowly released than the volumes detained by the SCM mix.

The slow-release benefit of bioretention is more in the investigative stages and to date is arguably less certain but worth recognizing for these purposes; it is the relative ability of bioretention to produce a treated discharge that mimics undeveloped sites in both flow volume and rate. Research suggests that bioretention outflows "may mirror post-storm event shallow groundwater inter-event stream recharge flow." [81] To the extent that bioretention provides these more "natural" stormwater releases to streams than other SCMs, the annual volumes of this "slow effluent" that would result in Neuse and Tar basins confer a superior benefit on receiving streams along with their increased magnitude as quantified in Tables 6-28 and 6-29 above. As seen in the tables, this slow effluent is roughly double the runoff eliminated fraction among bioretention runoff fates.

Benefits: Low-end cost scenario - Infiltration and Wetland SCM Pair

The Low-End cost scenario assumes a mix of infiltration and wetland practices. The scenario is intended to estimate a theoretical lower bound on new costs. Like the all-bioretention scenario, a complete shift to these two

[81] DeBusk, K.M., W.F. Hunt, and D.E. Line, 2011. Bioretention Outflow: Does It Mimic Nonurban Watershed Shallow Interflow? *J. Hydrol. Eng.,* 16(3): 274-279.

practices is not likely. Unlike the bioretention scenario, analysis suggests costs would favor this treatment outcome, estimating an overall cost savings in the Neuse and a reduced cost in the Tar relative to the baseline mix. While this scenario achieves the highest amount of nutrient reduction and hydrologic benefit of all three scenarios, it was based on the simplistic assumption of constructed wetlands for all Coastal Plain treatment acres and infiltration for all Piedmont acres. It is expected that site-specific soils, sizing and geometry factors, among others, will limit this potential.

Likelihood aside, use of the SCM pair across all communities in both basins would result in nitrogen reductions ranging between 5,000 and 6,000 lbs/yr, marginally greater than bioretention but five- to six-fold greater than reductions estimated for the SCM mix. Phosphorus reductions of approximately 380 lbs/yr would also be achieved, almost twice that estimated for bioretention and many times the small phosphorus reductions estimated for the SCM Mix.

Because infiltration effectively eliminates 84% of stormwater runoff it is by far the most effective practice for achieving the runoff elimination benefit; as a result, the low-cost pair would eliminated approximately 123 million ft3 of runoff each year across the two basins. That is approximately thirteen times the runoff eliminated by the most likely SCM mix and almost double that of bioretention. Since infiltration infiltrates the entire water quality volume, there is no detained-and-discharged volume; thus, relative to the baseline mix, Table 6-29 shows negative values for the latter. In this case of course, the negative values are indicative of a much-preferred environmental outcome.

Qualifying Factors on Nutrient Benefits of Proposed Rule

The net nutrient load reduction benefits quantified above require adjustment based on two notable factors. Actual loading benefits to stream will differ from values estimated above depending on the relative magnitude of each. Overall, it appears that net nitrogen load reduction benefits will be greater than those estimated above, while net phosphorus benefits will not be meaningfully altered by these factors. As the relative importance of these factors emerged through the fiscal analysis development and review process, results are quantitative and are provided in this supplemental information form.

First, runoff nitrogen load estimates produced by the proposed SNAP accounting tool, in capturing refinements in stormwater science, are generally lower than those estimated by the current Tar-Pamlico tool. In most scenarios, SNAP estimates lower untreated nitrogen loading rate values for developed land covers than does the Tar tool, and it also estimates greater SCM treatment reductions than the Tar tool across SCMs of interest. Phosphorus differences are mixed, with SNAP estimating higher untreated loads and lower, equal or higher treated loads depending on the SCM. For this reason, phosphorus is generally not considered a concern and this discussion will focus on nitrogen. As illustrated with simple unit-area loading rate comparisons in Table 6-30 below, untreated nitrogen loading difference between the two tools is negligible at 25% BUA but diverges with increasing development intensity such that SNAP estimates about 1.5 lb/ac less at 50% BUA and 4 lb/ac less at 90% BUA. Treatment increases in SNAP vary by SCM, with bioretention, as estimated by the new tool, showing distinctly greater marginal load improvement than do other SCMs.

TABLE 6-30 UNIT NUTRIENT LOADING ESTIMATES COMPARED, TAR-PAMLICO TOOL VS SNAP

	Unit-Area NITROGEN Loading Rate (lb N/ac/yr) % BUA			Unit-Area PHOSPHORUS Loading Rate (lb P/ac/yr) % BUA		
	25%	**50%**	**90%**	**25%**	**50%**	**90%**
Untreated						
Tar Tool	4.05	8.53	15.65	0.62	0.99	1.65
SNAP	4.00	7.00	11.63	0.82	1.15	1.65
Difference	**0.05**	**1.53**	**4.02**	**-0.20**	**-0.16**	**0.00**
Wet Pond						
Tar Tool	3.06	6.44	11.81	0.35	0.58	0.97
SNAP	3.13	5.59	9.37	0.44	0.73	1.18
Difference	**-0.07**	**0.85**	**2.43**	**-0.09**	**-0.15**	**-0.22**
Wetland						
Tar Tool	2.43	5.12	9.39	0.40	0.64	1.07
SNAP	2.32	4.15	7.12	0.39	0.65	1.09
Difference	**0.11**	**0.97**	**2.27**	**0.01**	**-0.01**	**-0.02**
Bioretention						
Tar Tool	2.77	5.58	10.24	0.36	0.53	0.89
SNAP	1.24	2.21	3.71	0.25	0.43	0.71
Difference	**1.53**	**3.37**	**6.53**	**0.11**	**0.10**	**0.18**
Baseline SCM Mix						
Tar Tool	2.97	6.24	11.44	0.35	0.58	0.97
SNAP	2.90	5.17	8.70	0.42	0.70	1.14
Difference	**0.08**	**1.07**	**2.74**	**-0.06**	**-0.12**	**-0.16**

The impact of the generally lower new nitrogen load estimates both before and after treatment by the SNAP tool under the proposed rule is both a reduced overall reduction need based on untreated loading rate differences and a reduced need for nitrogen offsets following treatment, particularly toward the higher end of development intensity. On the latter effect, where onsite treatment is required by the current Neuse and Tar rules, under the proposed rule less nitrogen offset will be required after the same SCM is used, resulting in less load-reducing activity on the ground for current programs under the proposed rule.

This loss in offset nitrogen load reduction under the proposed rule would not occur on development falling under the newly added programs, since no nutrient requirements are in place there currently. Nor would it occur on development acres now required to treat by NPDES, WSW or Coastal rules and that achieve the rate targets with one SCM, since no offset is needed in such cases. On newly treated acres under current programs, loss of offsets would be limited to the effect of the lower untreated loading rate because these acres are currently below 6 or 10 lb N/ac untreated and achieve rate targets entirely through offset. On the fraction of current program acres that requires treatment by exceeding 6 or 10 lb N/ac/yr, loss of offsets occurs not only via the reduction in untreated loading rate but also from the greater treatment efficiency credited under the proposed rule. For the Neuse, these higher loading rate fractions would total to 38% (660 ac) of residential acres and 59% (120 ac) of commercial/industrial acres for a total of 780 acres/yr in the basin. For the Tar-Pamlico, the higher loading rate acres would total 51% of residential and 79% of commercial acres, about 265 acres/yr. On these acres, under the most likely SCM scenario, the loss of residential offset reductions via greater treatment ranges up to 1.1 lb N/ac and the loss of commercial offsets ranges up to 2.74 lb N/ac. At the same time, the loss of offset required via

untreated loading rate difference ranges from 0 to 0.8 lb N/ac for residential and 1.5 to 2 lb N/ac for commercial. Under both an all-bioretention scenario and the infiltration/wetland scenario in the proposed condition, where after treatment the entire range of development intensity meets either basin's nitrogen target, requiring no offset, the loss of offsets would be greater, with residential ranging up to 2 lb N/ac and commercial up to 6.5 lb N/ac.

This overall loss of nitrogen offset reductions will be countered by the second factor alluded to above, a net increase in real nutrient removal via the greater extent of onsite treatment required under the proposed rule as compared to the current achievement of the same nominal reductions through offsets. That is, the nutrient reduction credit rates assigned to the default nutrient offset practice, riparian buffer restoration on rural land, are now believed to be substantially overestimated, resulting in offset reductions of only a portion of the nominal value. This credit was established around 1999 based on available science ranging across the eastern U.S.. Since that time, further research has refined our understanding of how buffers perform to reduce nutrients. These advances include state and physiographic region-specific estimates of the size of catchments draining to buffers and the net nutrient reduction improvement attributable to buffer restoration. Both factors play a significant role in the reduction credit currently awarded for the buffer restoration practice. Under the current crediting method, drainage area to the buffer is a constant value where one buffer acre is assumed to receive runoff from 10.8 upland acres of catchment. More recent state-specific evidence shows that Piedmont North Carolina catchments typically have much smaller nominal areas based on surface topography. A dissertation by Bruton[82] examined stream densities as depicted on USGS topographic maps compared to field determinations and found densities corresponding to drainage areas in the Piedmont and Coastal Plain averaging 5.2 acres and 7.3 acres respectively per acre of 50-foot buffer. Informal case study reviews of nutrient offset projects by DWQ staff found a combination of factors that reduced actual catchment to buffer ratios below Bruton's values. Under the current method, buffer treatment of throughput from the drainage area represents most of the buffer's total reduction.

A second factor in the buffer's throughput treatment credit is treatment efficiency. The current method uses a simple 50% removal efficiency. While an abundance of research has shown nitrogen removal at this level and greater (Mayer et al., 2007)[83], the vast majority of that research measures overall performance of intact buffers rather than the net improvement in performance resulting from buffer restoration. In contrast, North Carolina-specific analysis by Osmond et al.[84] estimates net N reduction efficiencies of restored buffers in agricultural settings, which ranges between 20% and 35% depending on buffer width. Osmond's results are incorporated into

---

[82] Bruton, Jeffrey Griffin. 2004. Headwater Catchments: Estimating Surface Drainage Extent Across North Carolina and Correlations Between Landuse, Near Stream, and Water Quality Indicators in the Piedmont Physiographic Region. Ph.D. Dissertation. Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27606.

[83] Mayer, P.M., S.K. Reynolds, Jr., M.D. McCutchen, and T.J. Canfield, 2007. Meta-Analysis of Nitrogen Removal in Riparian Buffers. Journal of Environmental Quality 36:1172-1180. Accessed online 12/15/12 at: http://sanjuanco.com/cdp/docs/CAO/MayerReynolds2007.pdf.

[84] Osmond, D.L., Gilliam, J.W., King, S., Evans, R.O. 2006. Riparian Buffer Effectiveness Project: Final Report to NC DENR. Accessed online 12/15/10 at: http://h2o.enr.state.nc.us/nps/documents/FinalReport-EW05014.pdf.

the current buffer restoration credit in the accounting tool used to track agriculture's compliance with Neuse and Tar-Pamlico agriculture rules.

These advances in the supporting science have led increasingly to the conclusion that nitrogen credit values assigned to this practice likely overestimate reductions by a factor of roughly 3 to 5. Credit values estimated by others, including Line and Hunt[85], support this assessment.

Assuming substantially greater certainty of load reduction estimates attributed to stormwater SCMs than to buffer restoration credits, an assumption staff considers valid, the proposed rule's greater reliance on onsite treatment rather than offsets effectively increases real load reductions relative to those achieved under the current rule on the acres shifted from offset to treatment. These acres represent the previously discussed, unintended gap in onsite treatment requirements that would be closed by the proposed rule. They are listed as the "newly treated" acres under current programs in Table A-9. In the Neuse, 37% of residential acres and 15% of commercial acres, totaling 668 ac/yr would have used offsets exclusively but will be required to treat onsite under the proposed rule. In the Tar, treatment will be newly required on 49% of residential and 21% of commercial acres, totaling 219 acres.

The following Tables 6-31 through 6-33 summarize estimates of the comparative losses and gains in actual N load reductions resulting from the two countervailing effects described above. As shown, the comparative gains in reductions via onsite treatment will match and likely substantially outweigh the reductions actually being obtained currently through offset payments.

TABLE 6-31 EFFECT ON NUTRIENT BENEFITS OF COUNTERVAILING FACTORS IN CURRENT PROGRAMS: SCM MIX

SCM MIX	Neuse Basin		Tar-Pamlico Basin	
Loss of N Reductions via Accounting Tool Change	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Already Treated Acres w/Reduced N Offset (ac/yr)	660	120	210	55
Unit Range of Treated Loading Lost N Offset (lb N/ac)	0.6 – 1.1	1.4 - 3	0.6 – 1.1	1.4 - 3
Annual Lost N Offsets, Already Treated Acres (lb N/yr)	400 - 730	170 - 360	130 – 230	80 – 160
Newly Treated Acres (ac/yr)	640	30	200	14
Unit Range, Untreated Loading Rate Decrease, SNAP (lb N/ac)	0 – 0.8	1.5 – 2	0 – 0.8	1.5 – 2
Annual Lost N Offsets, Newly Treated Acres (lb N/yr)	0 – 512	45 – 60	0 - 160	21 - 28
Basin Total Lost N Offsets (lb N/yr)	657 – 1,658		246 - 584	
Conservative Offset Actual Reduction Factor	.2 - .33			
Total Lost N Offsets Adjusted to Actual (lb N/yr)	131 - 547		49 - 193	
Gain of N Reductions via Onsite Treatment	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Acres Shifted from Offset to Treated (ac/yr)	637	31	205	14
Treatment Reductions, Newly Treated Acres, SNAP (lb N/ac)	1.0 – 1.6	2.2 – 2.4	1.0 – 1.6	2.2 – 2.4
Treatment Reductions, Basin Totals (lb/yr)	690 – 1,071		231- 354	
Net Effect of Countervailing Factors				
Net Reductions, Treatment vs. Lost Offsets (lb N/yr)	523 - 559		162 - 180	

[85] Line, D.E. and W.F. Hunt, 2007. Cost Effectiveness of Agricultural and Urban BMPs for NC. Final Report to NC Division of Water Quality for 319 Grant Contract EW06077. June 2007. 35 pp.

TABLE 6-32 EFFECT ON NUTRIENT BENEFITS OF COUNTERVAILING FACTORS IN CURRENT PROGRAMS: BIORETENTION

High-End Bioretention	Neuse Basin		Tar-Pamlico Basin	
Loss of N Reductions via Accounting Tool Change	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Already Treated Acres w/Reduced N Offset (ac/yr)	660	120	210	55
Unit Range of Treated Loading Lost N Offset (lb N/ac)	0	0	0	0
Annual Lost N Offsets, Already Treated Acres (lb N/yr)	0	0	0	0
Newly Treated Acres (ac/yr)	640	30	200	14
Unit Range, Untreated Loading Rate Decrease, SNAP (lb N/ac)	0 – 0.8	1.5 – 2	0 – 0.8	1.5 – 2
Annual Lost N Offsets, Newly Treated Acres (lb N/yr)	0 – 512	45 – 60	0 - 160	21 - 28
Basin Total Lost N Offsets (lb N/yr)	45 - 572		21 - 188	
Conservative Offset Actual Reduction Factor	.2- .33			
Total Lost N Offsets Adjusted to Actual (lb N/yr)	9 - 189		4 - 62	
Gain of N Reductions via Onsite Treatment	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Acres Shifted from Offset to Treated (ac/yr)	637	31	205	14
Treatment Reductions, Newly Treated Acres, SNAP (lb N/ac)	2.4 – 3.6	4.8 – 5.4	2.4 -3.6	4.8 – 5.4
Treatment Reductions, Basin Totals (lb/yr)	1,678 – 2,451		559 - 811	
Net Effect of Countervailing Factors				
Net Reductions, Treatment vs. Lost Offsets (lb N/yr)	1,669 – 2,262		555 - 749	

TABLE 6-33 EFFECT ON NUTRIENT BENEFITS OF COUNTERVAILING FACTORS IN CURRENT PROGRAMS: SCM PAIR

Low-End SCM Pair	Neuse Basin		Tar-Pamlico Basin	
Loss of N Reductions via Accounting Tool Change	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Already Treated Acres w/Reduced N Offset (ac/yr)	660	120	210	55
Unit Range of Treated Loading Lost N Offset (lb N/ac)	0	0	0	0
Annual Lost N Offsets, Already Treated Acres (lb N/yr)	0	0	0	0
Newly Treated Acres (ac/yr)	640	30	200	14
Unit Range, Untreated Loading Rate Decrease, SNAP (lb N/ac)	0 – 0.8	1.5 – 2	0 – 0.8	1.5 – 2
Annual Lost N Offsets, Newly Treated Acres (lb N/yr)	0 – 512	45 – 60	0 - 160	21 - 28
Basin Total Lost N Offsets (lb N/yr)	45 - 572		21 - 188	
Conservative Offset Actual Reduction Factor	.2- .33			
Total Lost N Offsets Adjusted to Actual (lb N/yr)	9 - 189		4 - 62	
Gain of N Reductions via Onsite Treatment	**Residential**	**Comm/Ind**	**Residential**	**Comm/Ind**
Acres Shifted from Offset to Treated (ac/yr)	637	31	205	14
Treatment Reductions, Newly Treated Acres, SNAP (lb N/ac)	2.4 – 3.6	4.8 – 5.4	2.4 -3.6	4.8 – 5.4
Treatment Reductions, Basin Totals (lb/yr)	1,890 – 2,820		631 - 933	
Net Effect of Countervailing Factors				
Net Reductions, Treatment vs. Lost Offsets (lb N/yr)	1,881 – 2,631		626 -871	

Clearly, stormwater loading and SCM reduction estimates involve their own sources of uncertainty. However, the engineered, structured and controlled character of stormwater management lends itself to narrowing of uncertainties through controlled studies, these subjects have received significant in-state research since the 1990's, and those advances have been incorporated into stormwater design specifications and accounting methods. And while stormwater technology and loading quantification improvement needs continue to exist, by contrast the ecosystem improvement practice of riparian buffer restoration by its nature involves relatively little or no engineering, relies on assisting natural processes, and inherently involves significant and often unknown forms or extents of variability from project to project. Study results reflect this great variability, as captured in a seminal 2007 statistical analysis of buffer research[86]. In addition, comparatively little in-state research has been conducted on nutrient loading effects of riparian buffer restoration practices in the 21st century. However, sufficient science has accumulated to identify fundamental refinement needs to the current buffer restoration credit method, and staff has identified the need to pursue its revision as resources permit.

The loss of offset reductions resulting from current over-crediting of the buffer restoration practice would apply to the offsets generated under the proposed programs as well as to current programs discussed to this point. In proposed programs, there is no countervailing shift to onsite treatment that exists with current programs, so the overall nitrogen loading benefits quantified above for proposed programs incorporate a downward adjustment to estimate true anticipated reductions for offsets based on current practice. The estimated Neuse proposed program nitrogen benefits are entirely due to offset, while a small portion of the Tar reductions are offsets and most are from onsite treatment.

Nutrient Benefit Quantification Methods:

Tar-Pamlico: Estimating nutrient reduction benefits under the Tar-Pamlico rule is the simpler calculation since no stormwater controls are currently required and all treatment required under the proposed rule will provide new nutrient reduction benefits.

To estimate the benefits, staff calculated and compared average untreated and treated nitrogen and phosphorus loading rates for the range of intensities in each development category. This was done for all three SCM scenarios. The difference between the untreated and treated loading rate represents the unit nutrient reduction benefit in pounds per acre per year. This unit benefit was multiplied by the number of acres being treated to determine the total benefit in pounds removed per year.

Calculations for both baseline and proposed conditions were performed using the SNAP Tool, which provides a more conservative estimate of reductions than if baseline loading had been estimated using the Tar-Pamlico tool. Staff chose this approach given the SNAP tool provides the best current estimates of loading, which was considered appropriate for estimating actual benefits, unlike the calculations done to compare regulatory loading requirements using baseline and proposed regulatory compliance methods.

Neuse: The Neuse calculation is slightly more complicated since the added Neuse communities are already implementing SCMs to meet their existing stormwater requirements. Following the method used to estimate rule costs, a weighted average percent reduction efficiency for the baseline SCM mix was used to calculate per acre

[86] Mayer, Paul M, S.K. Reynolds, Jr, M.D. McCutchen, and T.J. Canfield, 2007. Meta-Analysis of Nitrogen Removal in Riparian Buffers. *J. Environ. Qual.* 36: 1172-1180. June 2007.

nitrogen and phosphorus loading rates for the baseline condition. Treated loading rates were similarly calculated for all three SCM scenarios and compared to baseline results to yield the net benefit of meeting the rate targets in the proposed condition compared to the current requirement of other rules to simply treat the affected acres. As with previous calculations, the unit benefit was applied to the acres affected to estimate total benefit in pounds removed per year. As with the Tar-Pamlico benefit calculation, SNAP was used for both baseline and proposed conditions.

One difference with benefit estimates from cost calculations is that the entire net load reduction was recognized, including reductions that exceeded rate targets, since they are real benefits. Similarly, although there is not a phosphorus reduction requirement in the Neuse, a phosphorus treatment benefit occurs and was included.

Hydrologic Benefit Quantification Methods:

To estimate hydrologic benefits, for each SCM scenario, staff again developed unit estimates which were then applied to affected acres. As with nutrient benefits, the SNAP tool was used throughout as the best available estimator of actual benefit. Pre-treatment runoff volumes were estimated for development scenarios with 25% BUA, 50% BUA and 90% BUA, then partitioned according to runoff "fates" established for each SCM. Runoff that enters an SCM can be treated and released as treated effluent, bypass the SCM as untreated overflow, or be eliminated through evapotranspiration (ET) or infiltration into the underlying soil. Runoff partitioning for each SCM is provided in Table A-2 of the 2017 NCDEMLR Stormwater Credit Document (NCDEMLR, 2017)[87] . For this analysis, a Hydrologic Soil Group of C was assumed as a central tendency for Piedmont soils and since most development acres across both current and proposed programs are located in the Piedmont.

By comparing the different fates across treatment scenarios staff were able to estimate the two hydrologic benefits described above, presented as runoff eliminated and runoff detained. The runoff fates for the three SCM scenarios were then compared against the baseline condition, whether that was a no treatment scenario or baseline SCM Mix treatment. Volume partitioning for the SCM mix and SCM pair were weighted based on the relative proportions of the individual SCM in each treatment combination in the same manner as done in the nutrient reduction calculations.

For each treatment scenario the differences in runoff fates for the 25% and 50% BUA scenarios were averaged together to represent the municipal/residential development category and the 50% and 90% BUA scenarios were averaged together to represent the commercial category. A detailed breakout of the hydrologic benefits for each development category is provided in Table A-10 in Appendix A.

6.7 STORMWATER RULE POLICY ALTERNATIVES

Several policy alternatives to the proposed Stormwater Rules were considered as staff worked with the stakeholders local governments in the Neuse and Tar-Pamlico River Basins. The most significant policy alternative raised during this process concerned the geographic applicability of the rule requirements. In both the current and

[87] North Carolina Division of Energy, Mineral, and Land Resources, 2017. North Carolina Stormwater Controls Credit Document. https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Stormwater/BMP%20Manual/SSW-SCM-Credit-Doc-20170807.pdf

proposed rule, only those local governments listed by name are subject to rule requirements. One alternative raised by stakeholders was to apply the rule to all local governments in each river basin, regardless of their size or projected growth. This approach was not used in the proposed rules for several reasons.

First, staff felt it was more appropriate and scientifically defensible for a rule that requires controls on new growth to limit its scope to communities showing significant growth. This continues the approach used during the original rule development process. An analysis of population growth in the basin over the past sixteen years shows that not all local governments in the Neuse and Tar-Pamlico River Basins have experienced significant growth. In fact, there are several local governments, especially in the more rural Tar-Pamlico River Basin, that have experienced negative growth in recent years.

Second, given their smaller populations and smaller tax base, many of the low- or no-growth communities in these two river basins lack the financial resources or staff to implement a stormwater program. Given that these low growth communities would more than likely have little to no new development occurring in the coming years, it seemed unnecessary to include them in the rule and subject them to the costs of developing stormwater programs that are not likely not to be implemented due to the lack of development within their jurisdictions.

Based primarily on these two factors, as with the original rules, the Basinwide alternative was not proposed. The adaptive management provision added to the Purpose and Scope Rules sets the intent to revisit this type of question in the future. It will give staff the ability to consider updated population growth and development information in any future rule revision process. Any such process would also include additional opportunity for stakeholder input on this alternative in addition to the opportunity to accept and review new information.

Another community designation criterion suggested was an absolute geographic size approach irrespective of growth rate, based at least in part on the concern that recent research has shown that once developed land acreage surpasses a certain fraction of watershed area, receiving streams become degraded. This approach was considered impractical to apply in more than one respect. One concern is that watersheds exist on multiple, nested spatial scales, and any basis for distinguishing a threshold scale of concern, or alternatively a logic for considering inclusion of any individual community when contemplating the basin scale, seemed problematic. Another was that the driving concern of the science on watershed development and stream impacts, while related is ultimately distinct from the regulatory objective of restoring the estuary, or at least did not seem appropriate to elevate to the deciding criterion for inclusion of communities over the use of absolute growth rate going forward given the rule's focus of addressing new growth.

CHAPTER 7 OTHER RULE REVISIONS & NEW RULES

The ten remaining Neuse and Tar-Pamlico rules addressed in this section of the fiscal analysis are identified in Table 7-1 below. They include five rules proposed for repeal because they are no longer necessary and three rules proposed for readoption with only minor revisions and technical corrections that do not add any additional budgetary costs to state, local government or private entities. These rules create minor staff time opportunity costs. The final two rules, .0701 Definitions and .0730 Tar-Pamlico Purpose and Scope, are new rules being proposed that will improve clarity and implementation of existing requirements, but do not contain any new requirements that result in additional costs or benefits to be quantified.

TABLE 7-1 REVISED RULES WITHOUT IMPLEMENTATION COSTS

Proposed for Readoption w/ Amendments - No Additional Costs
.0232 Neuse Purpose & Scope
.0236 Neuse Agriculture Rule
.0256 Tar-Pamlico Agriculture Rule
Proposed for Repeal
.0236 Neuse Agriculture Nutrient Loading Goals
.0255 Tar-Pamlico Nutrient Loading Goals
.0239 Neuse Nutrient Management
.0257 Tar-Pamlico Nutrient Management
.0237 Best Management Practice Cost-Effectiveness Rate
New Rules – No Additional Costs
.0701 Definitions
.0730 Tar-Pamlico Purpose & Scope

The following sections briefly describe each of these ten rules, the changes proposed, and includes a brief qualitative analysis of the effects of these changes. Revisions to these rules either provide clarification to existing requirements are already being fully implemented. None of the proposed revisions discussed in this section will require state agencies, local governments, or private parties to procure additional staff or funding..

7.1 NEUSE & TAR-PAMLICO PURPOSE & SCOPE RULES

The existing Neuse and proposed Tar-Pam Purpose & Scope Rules, 15A NCAC 02B .0232 and .0701, are administrative in nature and do not impose requirements on the regulated community. They serve as the organizational backbone for each set of rules by establishing the objectives for both management strategies. They also identify the set of rules comprising each strategy and define the area to which the rules apply. Lastly, they serve to identify the baseline time period for each strategy and establish nitrogen and phosphorus percentage reduction goals relative to the baseline.

7.1.1 PROPOSED REVISIONS TO PURPOSE & SCOPE RULES

Proposed revisions to the Neuse Purpose & Scope rule are minor in nature and are primarily clarifying edits with no substantive policy changes regarding implementation of requirements.

The Tar-Pam nutrient strategy did not originally include a Purpose and Scope rule when the strategy was first adopted in 2001. The text of the Tar-Pam Purpose & Scope rule proposed as part of this readoption process is a new rule and follows the same organization structure of the revised Neuse rule and will serve to provide clarity and consistency with for implementing the Tar-Pamlico management strategy.

One notable provision proposed in the revised Neuse rule and included in the new Tar-Pamlico rule is the addition of adaptive management language. This provision recognizes the ongoing water quality issues in both estuaries and that the availability of more information to evaluate implementation over time which may result in further refinements to the rules should they be needed. It also adds a date by which an evaluation of progress will be completed and recommendations made by the Division including the requirement for the Division to report on implementation progress to the Water Quality Committee of the Environmental Management on a biannual basis.

7.1.2 IMPACT OF PROPOSED REVISIONS

Adding the adaptive management provisions to these rules serves two purposes. First, the additional reporting requirements performed by the Division will improve transparency and tracking of implementation progress. Second, it directs the Division to consider new information and technology while evaluating implementation progress, reductions achieved by individual sources and trends and shifts in loading and the water quality impairment relative to the defined water quality goals of each strategy.

As a result of adding this provision the Division will consider all available information, including input for the regulated community as well as other stakeholders, to help guide implementation and inform future evaluations of strategy. These ongoing evaluations may result in recommendations on management needs including both regulatory and non-regulatory with the overall goal of achieving the strategy water quality goals. The reporting requirements included in this provision will be addressed by current staff within the Division and does not result in an increased budgetary cost to state government. However, state government will incur an opportunity costs associated with staff time devoted to these activities that will no longer be available for other activities. The opportunity cost is based on an estimate of 300 hours (biannually) of staff time per report to allow for the collecting of data, collaborating with stakeholders, drafting the report and internal review of the document. The opportunity costs for developing individual biannual reports for the Neuse and Tar-Pamlico management strategies is estimated to be $45,806 in net present value dollars, in each basin, over the next 10 years.

7.2 NEUSE & TAR-PAM AGRICULTURE RULES

The Neuse and Tar-Pam Agriculture Rules, 15A NCAC 02B .0236 and .0256, were enacted fairly close in time (1998 and 2001) and use the same basic regulatory approach. Each requires all persons engaging in agricultural operations in the watershed to collectively achieve and maintain a 30% net nitrogen loading reduction from the respective baseline in each Nutrient Management Strategy. The Tar-Pam has the added requirements on no increase in phosphorus loading from Agriculture as whole relative to the 1991 baseline.

Both rules provide agriculture operators with the option of becoming part of a collective local strategy for implementing BMPs or independently implementing standard BMPs as specified in the rule. Basin Oversight Committees (BOCs) and Local Advisory Committees (LACs) were established under the rules to implement the rules and to assist farmers with compliance.

The BOC's are required to submit an annual progress reports to the Environmental Management Commission. The BOCs and LACs rely on information generated from the Nitrogen Loss Evaluation Worksheet (NLEW), an accounting tool developed to provide a scientifically valid accountability method for nitrogen reduction. The primary use of

NLEW is to estimate relative reduction in nitrogen export through a pre- and post-BMP implementation calculation, rather than estimating delivery to surface waters. The results generated by NLEW represent edge of field nutrient reductions and not actual load inputs to stream and river segments directly discharging to the estuary.

Under the Tar-Pamlico rule, the BOC is also responsible for developing a phosphorus accounting method to comply with the phosphorus goal of the rule. A qualitative phosphorus accounting method that assesses the risk of increased phosphorus loss based on nine parameters was develop by a Phosphorus Technical Assistance Committee and approved by both the BOC and the EMC.

Annual reports from both the Neuse and Tar-Pamlico BOCs to the EMC documenting progress towards achieving the nutrient reduction objectives are required.

7.2.1 PROPOSED REVISIONS TO THE AGRICULTURE RULES

In general, the proposed revisions to the existing Neuse and Tar-Pamlico Agriculture rules do not change regulatory approach already being implemented. As these rules were adopted almost two decades ago the majority of changes are technical in nature, such as updating references, renumbering, and reorganizing of section of rule text to improve overall organization of the rule requirements and to codify long-standing protocols already being implemented by the agriculture community through existing agriculture assistance programs.

One notable revision to both rules is the addition of language addressing the accounting methodology used to estimate the percentage changes in nitrogen loss from agriculture lands. The current methodology provides 100% nitrogen reduction credit for land that goes out of agriculture such as when agriculture land is converted to development. This methodology is problematic because it does not recognize that once land leaves agricultural production and control, agricultural operators will not be able to maintain loading reductions on this land.

Proposed language in the rule addresses this accounting issue by calling on the Basin Oversight Committees in each basin to attempt an evaluation and adjustment of baseline losses and relative loss reduction progress based on data availability to address agricultural land lost to development. This would mean that the land use change would need to be accounted for as a reduction in the 'universe' of land under agricultural control in the basin. Agriculture's baseline load would be reduced accordingly. In this way, agriculture would be appropriately 'credited' for this change and agriculture's reduction progress would be measured against an updated baseline that reflects the nutrient contributions from lands still within the Agriculture universe.

7.2.2 IMPACT OF PROPOSED REVISIONS

Updating the accounting method to address agriculture land lost to development is conditional on the availability of data to complete the task. Efforts for updating the accounting methods will be made within current budget constraints and workload of current state government staff that are currently responsible for compiling the information used to draft the agriculture annual reports. These staff is also responsible for updating the accounting tools and methodologies as new science and information become available and presenting it for approval by BOCs, which are comprised entirely of volunteers operating within the responsibilities of their professional positions.

The agriculture communities in both the Neuse and Tar-Pamlico are both currently meeting and exceeding their mandated 30% nitrogen reduction with the agriculture community reporting 54% and 60% reduction in nitrogen loss in the Neuse and Tar-Pamlico river basins respectively. Given that agriculture has been meeting their collection nitrogen reduction goals since 2001 and continues to do so by such a large margin it is not expected that

this revision to the accounting method would change the agriculture communities' compliance with the reduction goals. However it would result in a more accurate accounting of agriculture's progress implementing the rules, and provide a better understanding of how much of the current progress is attributable to installing best management practices and other changes in their management activities versus loss of agriculture land.

The accounting update proposed in the rules will provide better accounting of nutrient strategy implementation and provide improved transparency of how reductions are achieved. Since agriculture's baseline load would be reduced accordingly through this proposed accounting update agriculture would be appropriately 'credited' and agriculture's reduction progress would be measured against an updated baseline that reflects the nutrient contributions from lands still within the Agriculture universe.

In general, due to the unique nature of the way the Neuse and Tar-Pamlico strategies are designed with the use of a collective compliance approach and the fact that the agriculture sector is exceeding its reduction goals, refinements to the accounting methods over time have simply served to incorporate the latest in scientific understanding of agriculture practices and improve the overall assessment of agriculture's implementation of the rules. In the past these updates to the accounting method have not resulted in changes to the types of practices used as producers typically base their management decisions based on crop yields and other economic considerations with water quality being a secondary benefit. This rule revision will not require DEQ, the Division of Soil & Water Conservation, or local governments to procure additional staff and as such, there should be no economic cost or benefit to state agencies or local governments. The proposed changes will not require the agriculture community to deviate from current practices and therefore will not have an economic cost to producers or other private entities in the agriculture community

7.3 DEFINITIONS RULE

A new definitions rule is proposed for the new .0700 Nutrient Rules Section. Previously, the Neuse and Tar-Pam rules referenced the 15A NCAC 2B .0202 Definitions Rule. This new rule, 15A NCAC 2B .0703, contains all of the definitions for terms and phrases used in Section 2B .0700 in one location. It also incorporates by reference definitions in Rule 2H .1002 and state statutes. This rule will serve as the definitions rule for all nutrient management strategies**.**

This new rule was created so all of the definitions that apply to nutrient strategy rules can be found in one easy to find location and to provide clarity to the terms used thereby making the rules easier to understand. This should translate into less time spent by the regulated community subject to the rules as well as less time spent by state regulatory staff providing technical assistance. The amount of time saved will be inconsequential and will not represent a significant financial benefit; however, it is noted here for completeness.

7.4 NEUSE & TAR-PAMLICO NUTRIENT MANAGEMENT RULES (REPEAL)

The Neuse and Tar-Pamlico Nutrient Management Rule (.0239 and .0257) are largely education rules that require people who apply fertilizer in each basin, except residential landowners who apply fertilizer to their own property, to either take state-sponsored nutrient management training or have a nutrient management plan in place for the lands to which they apply fertilizer. The rule applies to fertilizer applicators, people who own or manage fertilized lands, and consultants who provide nutrient management advice.

The training option amounts to a one-time action by affected parties; there is no requirement for subsequent continuing education. Training classes were conducted in 2001-2002 in the Neuse and 2005-2006 in the Tar-Pam through a partnership between the NCSU Soil Science Department and North Carolina Cooperative Extension staff.

Any applicators that have already taken the training under the rules or have obtained a voluntary cost share contract for nutrient management from either the NC Division of Soil and Water Conservation or the USDA Natural Resources Conservation Service would be in compliance with the rule by virtue of having a certified nutrient management plan.

Based on past input from NCSU staff and extension it is believed that the vast majority of applicators in both the Neuse and Tar-Pamlico River Basins have received nutrient management training under rules or have opted to implement a certified nutrient management plan and would therefore already be compliant to the rules. There are no additional resources available to offer future training sessions and the benefit of any future trainings would likely be minimal with no additional benefit to the environment.

7.5 NEUSE & TAR-PAMLICO AGRICULTURE NUTRIENT LOADING GOALS (REPEAL)

The Agriculture Nutrient Loading Goals Rules for the Neuse and Tar-Pam (02B .0236 and 02B .0255, respectively) are brief rules that support the existing Agriculture Rules in each basin by simply stating who the rules apply to and the nutrient reduction goals agriculture operations are required to meet.

The proposed rule revisions to the Neuse and Tar-Pamlico Agriculture rules incorporate the information currently addressed in 02B .0236 and 02B .0255. As a result, these stand-alone goals rules are no longer necessary and are proposed for repeal. Repeal of these now redundant rules will have no impact on implementation of the rules or associated costs or benefits.

7.6 TAR-PAMLICO BEST MANAGEMENT PRACTICE COST-EFFECTIVENESS RATE (REPEAL)

The BMP Cost-Effectiveness Rate rule (2B .0237) for the Tar-Pam was originally adopted back in 1997 to establish a fixed cost-effectiveness rate representing the cost to achieve a reduction on kilogram of total nitrogen through the use of Best Management Practices (BMPs). The cost effectiveness of $29/kg of total nitrogen established in this rule is referenced in in the current Tar-Pam Non-Association Rule (2B .0229), which establishes the nutrient offset requirements for new or expanding facilities to address compliance with the Tar-Pamlico estuary TMDL.

The cost-effectiveness rate of $29/Kg established by this rule was based on relatively current research at the time, but it was also established before any credible nutrient trading programs were in existence. Section 3.3 of this analysis addresses the proposed revisions for rule 2B .0229 which would eliminate the need for the fixed cost-effectiveness rate for nitrogen only and instead proposes to provide market-based nutrient offset options requiring all increasing nutrient loads from new or expanding facilities to be offset by the acquisition of an equivalent amount of allocation and/or offset credit. Where offset credits are purchased, they will be subject to a point to nonpoint source trading ratio as proposed in the nutrient offset rule. As a result of the proposed revisions to rule 2B .0229 described in Section 3.3 of this analysis, rule 02B .0237 is no longer necessary and is proposed for repeal.

CHAPTER 8 ALTERNATIVES ANALYSIS

Alternatives for specific rules are discussed in the individual rule chapters of this document. No rule change alternatives are discussed for both the Neuse and Tar-Pamlico Wastewater Rules in Chapter 4 as well as the Nutrient Offset Rule in Chapter 5. The Nutrient Offset Rule chapter also contains a discussion about specific alternatives for credit stacking and point to nonpoint trading ratios. Finally, an alternative approach for the geographic applicability of the New Development Stormwater rule requirements for both the Neuse and Tar-Pamlico is discussed in Chapter 6.

8.1 NO RULE CHANGE ALTERNATIVES

The no rule change alternatives for the wastewater and nutrient offset rules were dismissed in favor of proposing revision to the waste water and offset rules because the statutorily-required rules readoption process presents an opportunity to revisit these rules to better address the regulatory objective as required by the Administrative Procedures Act, as well as the opportunity to incorporate practical knowledge gained during the past two decades of strategy implementation and from scientific advances in many fields.

8.2 CREDIT STACKING

The credit stacking options related to nutrient and stream credit stacking are discussed in Chapter 5 along with the proposed revisions to the nutrient offset rule. These options will be discussed with stakeholders during the public comment and hearing process, so the hearing officers can consider stakeholder input on these options during their deliberations.

8.3 NONPOINT SOURCE TRADING RATIO

As discussed in Chapter 5, earlier Division drafts of the offset rule proposed continuing the current 2:1 point to nonpoint uncertainty ratio. However, this raised stakeholder concerns, and in response the staff version provided to the May 2018 Water Quality Committee included a range of ratios for public comment. In May 2018 the NRCA submitted comments to the WQC requesting changes to the ratio, citing the continuation of the current ratio would result in an unreasonable burden to wasteater treatment facilites. The WQC of the Environmental Management Commission subsequently approved a ratio of a 1.1 to 1. A copy of the NRCA's May 8, 2018 comment letter is included as Attachment A-1 in Appendix A.

8.4 GEOGRAPHIC APPLICABILITY OF STORMWATER RULES

Alternative approaches considered for the geographic applicability of the New Development Stormwater rule requirements for both the Neuse and Tar-Pamlico are discussed in Section 6.7 of Chapter 6.

APPENDIX A: TABLES / FIGURES & SUPPORTING INFORMATION

Table A-1: Municipalities Currently Subject to the Neuse Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program[1]	Local Programs[2]		State Programs[3]	
			People	Acres	% of Total Annual Acres	NPDES Phase II or Post Construction	NSW	Water Supply Watershed	Coastal	ORW/ HQW
Municipality										
Durham	87,098	106,955	1,986	244	7.9%	x	x	x		
Cary	86,066	107,300	2,123	261	8.4%	x	x	x		
Raleigh	288,515	402,058	11,354	1,397	45.0%	x	x	x		
Garner	18,390	25,782	739	91	2.9%	x	x	x		
Smithfield	11,497	10,881	-62	-8	-0.2%		x	x		
Goldsboro	38,994	35,467	-353	-43	-1.4%	x	x	x		
Wilson	44,787	49,153	437	54	1.7%		x	x		
Kinston	23,550	21,441	-211	-26	-0.8%		x			
New Bern	23,146	29,064	592	73	2.3%		x		x	
Havelock	22,594	20,879	-171	-21	-0.7%		x		x	

Table A-2: Counties Currently Subject to the Neuse Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program[1]	Local Programs[2]		State Programs[3]	
			People	Acres	% of Total Annual Acres	NPDES Phase II or Post Construction	NSW	Water Supply Watershed	Coastal	ORW/ HQW
County										
Orange	22,876	27,645	477	59	1.9%	x	x	x		

Durham	29,098	32,534	344	42	1.4%	x	x	x		
Wake	140,593	172,659	3,207	395	12.7%	x	x	x		
Johnston	82,940	119,316	3,638	448	14.4%		x	x		
Wayne	63,003	74,393	1,139	140	4.5%		x			

Table A-3: Municipalities Proposed to be Subject to the Neuse Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program	Local Programs		State Programs	
			People	Acres	% of Total Annual Acres	NPDES Phase II or Post Construction	NSW	Water Supply Watershed	Coastal Storm-water	ORW/ HQW
Municipality										
Apex	8,183	11,493	331	41	4.3%	x		x		
Morrisville	4,967	12,497	753	93	9.8%	x		x		
Holly Springs	7,292	16,932	964	119	12.5%	x				
Fuquay	3,740	10,120	638	79	8.3%	x				
Knightdale	6,894	11,480	459	56	6.0%	x				
Wendell	4,414	5,814	140	17	1.8%	x				
Rolesville	1,407	3,840	243	30	3.2%	x		x		
Wake Forest	13,234	29,420	1,619	199	21.0%	x		x		
Clayton	8,566	15,963	740	91	9.6%	x		x		
Greenville	11,843	20,919	908	70	10%	x		x		
Winterville	4,950	8,862	391	30	4%	x				

Table A-4 Counties Proposed to be Subject to the Neuse Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program	Local Programs		State Programs	
			People	Acres	% of Total Annual Acres	NPDES Phase II or Post Construction	NSW	Water Supply Watershed	Coastal Storm-water	ORW/ HQW
County										
Nash County	9,590	11,628	204	25	2.6%	x		x		x
Green County	16,872	19,256	238	29	3.1%					
Wilson County	18,949	21,229	228	28	3.0%			x		x
Pitt County	20,380	24,102	372	46	4.8%	x		x		
Craven County	36,417	44,106	769	95	10.0%				x	

Table A-5 Municipalities Subject to the Tar-Pamlico Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program[1]	Local Programs[2]		State Programs[3]	
			People	Acres	% of Total Annual Acres	NPDES Phase II Permit or Post-Construc	NSW	Water Supply Watershed	Coastal	ORW/ HQW
Municipality										
Greenville	50,330	62,154	1,182	145	36.1%	X	X	X (partial)		
Henderson	10,527	9,901	-63	0	-1.9%	X	X			ORW (partial)
Oxford	8,202	8,204	0	0	0%		X			
Rocky Mount	57,362	56,898	-46	0	-1.4%	X	X	X (partial)		
Tarboro	11,232	11,363	13	2	0.4%	X	X	X (partial)		
Washington	9,621	9,648	3	0	0%		X		X	

Table A-6: Counties Subject to the Tar-Pamlico Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program[1]	Local Programs[2]		State Programs[3]	
			People	Acres	% of Total Annual Acres	NPDES Phase II Permit or Post-Construc	NSW	Water Supply Watershed	Coastal	ORW/ HQW
County										
BEAUFORT	30,557	33,576	302	37	9.2%		X		X	
EDGECOMBE	22,085	23,294	121	15	3.7%	X	X			
FRANKLIN	33,400	41,637	824	101	25.1%	X	X			
NASH	26,439	30,549	411	51	12.5%	X	X	X (partial)		X
PITT	32,502	37,807	530	65	16.2%	X	X	X (partial)		

Table A-7: Counties Proposed to be Subject to the Tar-Pamlico Stormwater Rule
Population & Current Stormwater Requirements

Local Government	Pop Census 2000	Pop Census 2010	Annual Growth (2000 - 2010)			Federal Program[1]	Local Programs[2]		State Programs[3]	
			People	Acres	% of Total Annual Acres	NPDES Phase II Permit or Post-Construc	NSW	Water Supply Watershed	Coastal	ORW/ HQW
County										
GRANVILLE	13,491	16,548	306	24	54.3%			x		
VANCE	17,495	19,355	186	14	33.1%			X (Not in Basin)		
WILSON	4,984	5,693	71	5	12.6%			X (Not in Basin)		

Table A-8: SCM Unit Costs From Falls Lake Fiscal Analysis

Excerpts from Falls Fiscal Analysis

Muni Residential

Loading = 5.03 lb/ac/yr	BMP Drainage Area (Ac)	BMP Footprint (Ac)	Per-BMP Install Cost ($/BMP)	Avg Per-Acre Land Cost ($/ac)	Per-BMP Land Cost ($/BMP)	Per-BMP Capital Cost (Install + Land) ($/BMP)	Per-BMP Planning Costs ($/BMP)	Per-BMP Reg Trans Costs ($/BMP)	Total Up-Front Cost ($/BMP)	Per-BMP Annual O&M Cost ($/BMP-Yr)
Stormwater Wetland	4.5	0.10	$7,977	$63,276	$6,549	$14,526	$1,994	$3,500	$20,020	$338
Bioretention	0.9	0.02	$5,590	$63,276	$1,546	$7,137	$1,398	$3,500	$12,034	$200
Wet Detention	8.0	0.14	$56,256	$63,276	$8,732	$64,989	$14,064	$3,500	$82,553	$961
Extended Dry Det.	8.0	0.14	$56,256	$63,276	$8,732	$64,989	$14,064	$3,500	$82,553	$961
Grassed Swale	1.0	0.01	$250	$63,276	$726	$976	$63	$3,500	$4,539	$205
Filter Strip/Level Spreader	2.5	0.29	$7,575	$63,276	$18,158	$25,733	$1,894	$3,500	$31,126	$236
Infiltration Devices	2.5	0.05	$8,800	$63,276	$3,296	$12,096	$2,200	$3,500	$17,796	$236
Buffer w/Level Spreader	2.3	0.46	$357	$63,276	$29,107	$29,463	$89	$3,500	$33,053	$233
Sand Filter	1.5	0.03	$70,084	$63,276	$1,905	$71,989	$17,521	$3,500	$93,010	$794

Commercial/Industrial

Loading = 8.38 lb/ac/yr	BMP Drainage Area (Ac)	BMP Footprint (Ac)	Per-BMP Install Cost ($/BMP)	* Avg Per-Acre Land Cost ($/ac)*	Per-BMP Land Cost ($/BMP)	Per-BMP Capital Cost (Install + Land) ($/BMP)	Per-BMP Planning Costs ($/BMP)	Per-BMP Reg Trans Costs ($/BMP)	Total Up-Front Cost ($/BMP)	Per-BMP Annual O&M Cost ($/BMP-Yr)
Stormwater Wetland	4.5	0.10	$7,977	$150,000	$15,525	$23,502	$1,994	$3,500	$28,996	$338
Bioretention	0.9	0.02	$5,590	$150,000	$3,666	$9,256	$1,398	$3,500	$14,154	$200
Wet Detention	8.0	0.14	$56,256	$150,000	$20,700	$76,956	$14,064	$3,500	$94,521	$961
Extended Dry Det.	8.0	0.14	$56,256	$150,000	$20,700	$76,956	$14,064	$3,500	$94,521	$961
Grassed Swale	1.0	0.01	$250	$150,000	$1,722	$1,972	$63	$3,500	$5,534	$205
Filter Strip/Level Spreader	2.5	0.29	$7,575	$150,000	$43,044	$50,619	$1,894	$3,500	$56,013	$236
Infiltration Devices	2.5	0.05	$8,800	$150,000	$7,813	$16,613	$2,200	$3,500	$22,313	$236
Buffer w/Level Spreader	2.3	0.46	$357	$150,000	$69,000	$69,357	$89	$3,500	$72,946	$233
Sand Filter	1.5	0.03	$70,084	$150,000	$4,516	$74,600	$17,521	$3,500	$95,621	$794

* Adjusted down from $230,000 for Neuse/Tar Basins

Table A-9: Matrix of SCM & Offset Needs with Associated 10-Yr NPV Costs

	Neuse Current Programs				Neuse Proposed Programs				Tar Current Programs				Tar Proposed Programs			
	Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l	
Total Annual Dev't Acres (ac/yr)	1,723		200		935		88		415		69		27		5	
Net New Treatment Costs, Newly Treated/Already Treated Acres	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated	Newly Treated	Already Treated
New/Existing Fractions Needing SCM	37%	63%	15%	85%	0%	100%	0%	100%	49%	51%	21%	79%	100%	0%	100%	0%
New/Existing Acres Needing SCM (ac/yr)	637	1086	31	169	0	935	0	88	205	210	14	55	27	0	5	0
10-Yr NPV Costs, New/Existing Treated Acres ($ million)																
Most Likely SCMs-Baseline Mix - New Up Front Costs	$31.99	$0	$1.81	$0		$0		$0	$10.65	$0	$0.85	$0	$1.31		$0.29	
Most Likely SCMs-Baseline Mix - New O&M Costs	$1.77	$0	$0.09	$0		$0		$0	$0.59	$0	$0.04	$0	$0.07		$0.01	
Total 10-Yr NPV, Most Likely SCMs - Baseline Mix	$33.76	$0	$1.90	$0		$0		$0	$11.24	$0	$0.89	$0	$1.37		$0.30	
Basin Total 10-Yr NPV Cost, Most Likely SCMs ($ m)	**$35.66**								**$13.80**							
Hi End Cost-All BR - New Up Front Costs	$50.84	$32.14	$2.91	$6.00		$27.67		$3.12	$16.95	$6.45	$1.36	$2.01	$2.07		$0.45	
Hi End Cost-All BR - New O&M Costs	$3.34	$2.67	$0.16	$0.40		$2.30		$0.22	$1.11	$0.53	$0.08	$0.14	$0.12		$0.02	
Total 10-Yr NPV, Hi End Cost - All BR	$54.18	$34.82	$3.07	$6.41		$29.98		$3.34	$18.06	$6.99	$1.44	$2.15	$2.19		$0.47	
Basin Total 10-Yr NPV Cost, Hi End ($ million)	**$131.79**								**$31.29**							
Low End Cost-Pied/Coast Pair - New Up Front Costs	$24.32	-$13.08	$1.45	-$1.95		-$11.26		-$1.02	$6.24	$4.52	$0.58	-$1.05	$0.95		$0.23	
Low End Cost-Pied/Coast Pair - New O&M Costs	$1.30	-$0.80	$0.06	-$0.13		-$0.69		-$0.06	$0.39	-$0.21	$0.03	-$0.05	$0.05		$0.01	
Total 10-Yr NPV, Low End Cost - Pied/Coast Pair	$25.62	-$13.88	$1.52	-$2.08		-$11.95		-$1.08	$6.63	$4.32	$0.61	-$1.10	$1.00		$0.23	
Basin Total 10-Yr NPV Cost, Low End ($ million)	**-$1.85**								**$11.68**							
Net New Offset Costs, All Development Acres	**TN**		**TN**		**TN**		**TN**		**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**
Most Likely SCMs Mix - Per Acre Offset Need (lb/ac/yr)	-0.91		-2.61		0.42		2.98		-0.92	-0.26	-2.70	-0.36	0.23	0.00	2.61	0.09
Most Likely SCMs Mix - Total Offset Need (lb/yr)	-1570		-521		391		262		-380	-107	-187	-24	6	0	13	0
10-Yr NPV Cost ($ million)	-$6.24		-$1.93		$1.57		$1.05		-$0.55	-$2.21	-$0.27	-$0.50	$0.01	$0	$0.02	$0
Basin Total 10-Yr NPV Offset Cost, Most Likely SCMs ($ m)	**-$5.54**								**-$3.50**							
Hi End-All BR - Per Acre Offset Need (lb/ac/yr)	-1.33		-5.59		0.00		0.00		-1.14	-0.26	-5.32	-0.45	0.00	0.00	0.00	0.00
Hi End-All BR - Total Offset Need (lb/yr)	-2290		-1117		0		0		-475	-107	-367	-31	0	0	0	0
10-Yr NPV Cost ($ million)	-$8.47		-$4.13		$0		$0		-$0.69	-$2.21	-$0.53	-$0.64	$0	$0	$0	$0
Basin Total 10-Yr NPV Offset Cost, Hi End SCM ($ m)	**-$12.60**								**-$4.07**							
Low End Pair - Per Acre Offset Need (lb/ac/yr)	-1.32		-5.34		0.03		0.63		-1.14	-0.26	-4.32	-0.38	0.00	0.00	0.20	0.01
Low End Pair - Total Offset Need (lb/yr)	-2270		-1067		27		56		-472	-107	-298	-26	0	0	1	0
10-Yr NPV Cost ($ million)	-$9		-$3.94		$0.11		$0.22		-$0.69	-$2.21	-$0.43	-$0.54	$0	$0	$0	$0
Basin Total 10-Yr NPV Offset Cost, Low End SCMs ($ m)	**-$12.44**								**-$3.87**							
Basin Total Combined Treatment/Offset Costs, 10-Year NPV ($ million)	**Neuse Basin**								**Tar-Pamlico Basin**							
Most Likely SCM Mix	**$30.12**								**$10.30**							
Hi End SCM - All Bioretention	**$119.19**								**$27.22**							
Low End SCMs - Piedmont/Coastal Pair	**-$14.29**								**$7.82**							

Table A-10. Matrix of Hydrologic and Nutrient Reduction Benefits of Proposed Rules

0	Neuse Current Programs				Neuse Proposed Programs				Tar Current Programs				Tar Proposed Programs			
	Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l		Muni Resid'l		Comm/Ind'l	
Total Annual Dev't Acres (ac/yr)	1,723		200		935		88		415		69		27		5	
Hydrologic Improvement Beneftis Newly Treated/Already Treated Acres	**Newly Treated**	**Already Treated**	**Newly Treated**	**Already Treated**	**Newly Treated**	**Already Treated**	**Newly Treated**	**Already Treated**	**Newly Treated**	**Already Treated**	**Newly Treated**	**Already Treated**	**Newly Treated**	**Newly Treated**	**Newly Treated**	**Already Treated**
New/Existing Fractions Needing SCM	37%	63%	15%	85%	0%	100%	0%	100%	49%	51%	21%	79%	100%	0%	100%	0%
New/Existing Acres Needing SCM (ac/yr)	637	1086	31	169	0	935	0	88	205	210	14	55	27	0	5	0
SCM Baseline Mix: Hydrologic Benefits (ft3/yr)																
Runoff Eliminated	5,932,393	0	505,927	0		0		0	1,905,160	0	232,726	0	251,386		81,665	
Runoff Detained	26,182,138	0	2,232,868	0		0		0	8,408,270	0	1,027,119	0	1,109,472		360,423	
Basin Total Runoff Eliminated (ft3/yr)	**6,438,320**								**2,470,938**							
Basin Total Runoff Detained (ft3/yr)	**28,415,006**								**10,905,284**							
Bioretention: Hydrologic Benefits (ft3/yr)																
Runoff Eliminated	12,756,066	17,527,225	1,087,864	4,786,186		15,092,507		2,491,856	4,096,551	3,395,848	500,417	1,550,365	540,540		175,600	
Slow Effluent	22,510,705	38,361,871	1,919,760	10,475,534		33,033,000		5,453,929	7,229,207	7,432,499	883,090	3,393,287	953,894		309,882	
Basin Total Runoff Eliminated (ft3/yr)	**53,741,704**								**10,259,321**							
Basin Total Slow Effluent (ft3/yr)	**111,754,800**								**20,201,859**							
Low End SCM Pair: Hydrologic Benefits (ft3/yr)																
Runoff Eliminated	28,681,640	38,273,325	2,446,030	10,451,355		26,600,459		3,708,846	5,546,970	3,650,287	677,595	1,666,529	965,878		313,776	
Runoff Detained	2,833,347	-39,790,104	241,634	-10,865,544		-27,891,566		-5,325,539	4,563,798	-3,952,582	557,494	-1,804,540	118,187		38,394	
Basin Total Runoff Eliminated (ft3/yr)	**110,161,655**								**12,821,035**							
Basin Total Runoff Detained (ft3/yr)	**(80,797,772)**								**(479,248)**							
Nutrient Reduction Benefits (All Acres)	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**	**TN**	**TP**
Most Likely SCMs Mix: Nutrient Reduction Benefit (lb/yr)	587-544	0	(64) - 15	0	78-129	0	52-87	0	191-175	0	(30) - 6	0	43	12	27	3
Basin Total Nitrogen Reduced (lbs/yr)	**654-774**								**231-251**							
Basin Total Phosphorus Reduced (lbs/yr)	**0**								**15**							
Bioretention: Nutrient Reduction Benefit (lb/yr)	1,529 - 2,114	0	149 -169	0	1,897	166	314	24	492 - 682	0	63 -67	0	98	17	32	4
Basin Total Nitrogen Reduced (lbs/yr)																
Basin Total Phosphorus Reduced (lbs/yr)	**190**								**21**							
Low End SCM Pair: Nutrient Reduction Benefit (lb/yr)	1,717 - 2,454	0	164 - 177	0	1,961	303	336	51	553 - 791	0	74 -79	0	112	21	37	6
Basin Total Nitrogen Reduced (lbs/yr)																
Basin Total Phosphorus Reduced (lbs/yr)	**354**								**27**							

Table A-11: Population & Acres of Growth 2000 -2016 (Current Communities)

Population & Acres of Development Growth Based on 2000 Census to 2016 OSBM Estimates Comparison

Neuse: Current

Community	2000 Populatio	2016 Populatio	% in basin	Adjusted 2016	Annual Growth	# of Households	Acres
Durham	87,098	255,397	52.7%	134,594	2,969	1,151	230
Cary	86,066	155,079	76.6%	118,791	2,045	793	159
Raleigh	288,515	448,706	100.0%	448,706	10,012	3,881	776
Garner	18,390	28,999	100.0%	28,999	663	257	51
Smithfield	11,497	11,238	100.0%	11,238	-16	-6	-1
Goldsboro	38,994	34,793	100.0%	34,793	-263	-102	-20
Wilson	44,787	49,406	99.8%	49,307	283	110	22
Kinston	23,550	20,672	100.0%	20,672	-180	-70	-14
New Bern	23,146	30,048	100.0%	30,048	431	167	33
Havelock	22,594	20,072	100.0%	20,072	-158	-61	-12
Orange County	22,876	54,883	48.8%	26,783	244	95	19
Durham County	29,098	41,868	73.1%	30,606	94	37	7
Wake County	140,593	205,545	84.7%	174,097	2,094	812	162
Johnston Count	82,940	134,729	97.9%	131,900	3,060	1,186	237
Wayne County	63,003	82,426	91.4%	75,337	771	299	60
Total	983,145	1,573,861			22,050	8,546	**1,709**

Tar-Pam: Current

Community	2000 Populatio	2016 Populatio	% Area in Basin	Adjusted 2016	Annual Growth	# of Households	Acres
Oxford	8,202	8,563	100.0%	8,563	23	9	2
Henderson	10,527	14,935	64.4%	9,618	-57	-22	-4
Rocky Mount	57,362	54,853	100.0%	54,853	-157	-61	-12
Tarboro	11,232	10,857	100.0%	10,857	-23	-9	-2
Greenville	50,330	87,989	77.8%	68,455	1,133	439	88
Washington	9,621	9,561	100.0%	9,561	-4	-1	0
Franklin County	33,400	57,189	89.6%	51,241	1,115	432	86
Nash County	26,439	41,244	79.9%	32,954	407	158	32
Edgecombe Cou	22,085	21,659	99.6%	21,572	-32	-12	-2
Pitt County	32,502	63,439	57.8%	36,668	260	101	20
Beaufort County	30,557	34,257	96.0%	32,887	146	56	11
Total	292,259	404,546		337,230	2,811	1,089	**218**

Notes:

Population Data from 2000 and 2010 Census

Populations for portion of LG within the River Basin (Neuse or Tar-Pam)

County Populations are for Unincorporated Areas Only - Does not Include Munis

(2.58 People per Houshold) Source: US Census Bureau

(5 Houses per Acre) Source: National Home Builders Association

2016 Population Adjust for % Area within Basin

Table A-12: Population & Acres of Growth 2000 – 2016 (Proposed Communities)

Population & Acres of Development Growth Based on 2000 Census to 2016 OSBM Estimates Comparison

Nuese - Proposed

Community	2000 Population	2016 Population	% In Basin	Adjusted 2016	Annual Growth	# of Households Added Annually	Acres
Apex	8,183	46,688	27.1%	12,652	279	108	22
Morrisville	4,967	24,456	79.9%	19,540	911	353	71
Holly Springs	7,292	31,247	49.1%	15,342	503	195	39
Fuquay	3,740	24,293	62.4%	15,159	714	277	55
Knightdale	6,894	13,786	100.0%	13,786	431	167	33
Wendell	4,414	6,533	100.0%	6,533	132	51	10
Rolesville	1,407	5,723	100.0%	5,723	270	105	21
Wake Forest	13,234	35,293	100.0%	35,293	1,379	534	107
Clayton	8,566	19,427	100.0%	19,427	679	263	53
Nash County	9,590	41,244	20.1%	8,290	-81	-31	-6
Green County	16,872	19,142	100.0%	19,142	142	55	11
Wilson County	18,949	26,957	81.4%	21,943	187	73	15
Pitt County	20,380	63,439	57.8%	36,668	1,018	395	79
Craven County	36,417	44,316	93.7%	41,524	319	124	25
					Total Growth		
Total	160,905	402,544			6,882	2,668	**534**

Tar-Pam-Proposed

Community	2000 Population	2016 Population	% In Basin	Adjusted 2016	Annual Growth	# of Households Added Annually	Acres
Granville County	13,491	37,444	42.8%	16,026	158	61	12
Vance County	17,495	29,353	48.1%	14,119	-211	-82	-16
Wilson County	4,984	26,957	18.6%	5,014	2	1	0
Total	35,970	93,754			-51	-20	**-4**

Notes:

Population Data from 2000 and 2010 Census

Populations for portion of LG within the River Basin (Neuse or Tar-Pam)

County Populations are for Unincorporated Areas Only - Does not Include Munis

(2.58 People per Household) Source: US Census Bureau

(5 Houses per Acre) Source: National Home Builders Association

2016 Population Adjust for % Area within Basin

Attachment A-1
May 8, 2018 Comment Letter from the Neuse River Compliance Association

On behalf of the Neuse River Compliance Association, please find attached its comments on the proposed rules regarding Nutrient Trading (15A NACA 2B .0701 and .0703). This substantial revision of the existing rule at 15A NCAC 2B .0240 is important to the NRCA and its members. In particular, the provisions on trading ratios for nonpoint to point source trading of nutrient credits could substantially impact the NRCA. In separate comments, the NRCA has explained the reasons that it supports the proposed rule submitted to you by Chairman Rubin. Proposed rule .0703 is in conflict with that proposal. It would establish a minimum trading ratio of 1:1.2 and another option would continue the ratio at the same level as is now established in 15A NCAC 2B .0234.

The Neuse Estuary nutrient rules are the oldest strategy rules with direct impacts on waste water treatment capacity. The rules date from 1998 when the science supporting the nutrient capture and reduction values of SCMs was in its infancy. Today, the science is substantially more robust and DEQ applies conservative measures in its methodology for valuing those reductions from SCMs. The purpose of the 1:2 ratio is now met by other means and the 1:2 ratio creates unreasonable burdens for the waste water treatment facilities in the Lower Neuse Basin. Accordingly, the NRCA urges the WQC to reject the proposed options sent forward by DWR and to substitute for them the provision crafted by Dr. Rubin.

In NC Gen. Stat.§143-215.8B(b)(1), the EMC received legislative direction on basinwide management plans: "Provide that all point sources and nonpoint sources of pollutants jointly share the responsibility of reducing the pollutants in the State's waters in a fair, reasonable, and proportionate manner, using computer modeling and the best science and technology reasonably available and considering future anticipated population growth and economic development." The requirement for joint responsibility for reducing pollutants in the Neuse Basin in a proportionate manner was fractured when the Falls rules were adopted. The WWTPs in that part of the basin were relieved from the 1:2 ratio and may use nutrient credits based on a 1:1 ratio.

To address that inequality, DWR has proposed that all WWTPs in all other nutrient sensitive waters also have to comply with a trading ratio as great as 1:2. In its comments, the NRCA shows that this recommendation is both inconsistent with the EPA Trading Policy and the means of addressing this issue in other basins.

The NRCA is also concerned about the potential that its members may have to establish nutrient banks to engage in the use of nutrient credits generated by other departments within their respective local governments. This serves no beneficial purpose and creates another obstacle to an open and responsible trading program. The NRCA commends its other comments to your attention as well.

If you have questions, please contact Dan McLawhorn or me at your convenience.

TO: WATER QUALITY COMMITTEE

FROM: NEUSE RIVER COMPLIANCE ASSOCIATION

Daniel F. McLawhorn, Chair

DATE: MAY 8, 2018

RE: PROPOSED APPROVAL OF 2B .0701 AND .0703 REGARDING NUTRIENT CREDIT APPROVAL AND TRADINIG PROGRAM

The Neuse River Compliance Association remains a stakeholder with great interest in these proposed rules. They will impact greatly the future of sewer utilities subject to the Neuse Estuary rules. When the nutrient strategy was developed 20 years ago, it was generally assumed the nutrient problems would be solved by now. Instead, we now recognize that nutrient controls will be required in the foreseeable future to address nutrient impairment of the Neuse Estuary. Given the limited allocation of nitrogen loading to the point sources, it is also now clear that allocation will be fully utilized in less than 20 more years. The nitrogen budget makes it necessary to consider other means by which the sewer utilities can meet the growth needs of municipalities in the basin.

The NRCA has a few general concerns with the proposed rules. The specific requests for change will be accompanied by an explanation of the request. To make the use of space more efficient, the introductory part of the rule number [15A NCAC 02B] is omitted.

.0701(39) – Definition of the term "Provider." As this term is proposed and the purpose paragraph of .0703 is proposed, any person who seeks nutrient offset credit is a "provider." The NRCA requests that term and the purpose be limited to persons who will sell or otherwise convey ownership for credits to persons subject to implementation of the rules. That limitation is consistent with the language of the statute authorizing the EMC to regulate this subject area. NC Gen. Stat. §143-214.26(a) begins with the key phrase: "(a) Nutrient offset credits may be purchased to partially offset nutrient loadings to surface waters required by the Environmental Management Commission." As proposed, it is unclear is each local government subject to the nutrient strategies will have to establish a nutrient bank. The burden to establish a nutrient bank should only fall on persons who will sell credits.

> Proposed revision: "'Provider" means any public or private person or entity that implements a nutrient reduction project and seeks nutrient offset credit for sale, lease, or conveyance in exchange for remuneration, including DMS.

.0701(40) – "Residential development." The proposed definition does not state whether it applies to mixed use building, or only to buildings that are exclusively used for residential purposes.

.0701(45) – "Temporary Nutrient Offset Credit." The concept of permanent credits is introduced by this rule. Prior credit projects which otherwise qualify as permanent credits should be allowed to get that approval. The last

sentence of this definition makes the ability to seek permanent credit status for those otherwise eligible projects unclear, if not barred. It should be deleted.

.0703(a) PURPOSE. The problem is discussed above. The rule states that it covers all persons who are implementing projects to achieve nutrient offset credits. That undefined term would include situations where local governments have joined together to achieve compliance as allowed by certain nutrient strategies. In its last sentence, the rule distinguishes nutrient offset credit from nutrient accounting, another undefined term. Based on the preceding sentence, the rule can be read to include joint compliance by multiple entities as being within the scope of the nutrient credit rule. That will require the local governments to establish nutrient banks and otherwise conform to this rule despite the stand alone provisions in the Falls and Jordan nutrient strategy rules. As such, it represents an amendment of those rules before the time when legislation authorizes amendment of those rules. The rule is unclear and should exclude from the coverage and purpose actions taken to create nutrient offset credits which will not be sold, leased or otherwise conveys ownership of the credits to another person as well as joint compliance by multiple entities.

> Proposed revision: "(a) PURPOSE. The purpose of this Rule is to establish standards and procedures applicable to providers for approval of nutrient reduction projects and associated nutrient offset credits that will be transferred to ~~or utilized by~~ persons or entities subject to nutrient rules of this Subchapter. Nutrient offset credits represent a compliance option, ~~including to support joint compliance by multiple entities~~, where allowed by nutrient rules of this Subchapter. Nutrient offset credit is distinct from nutrient accounting for direct compliance with individual nutrient strategy rules, which is not governed by this rule. Nutrient accounting includes joint compliance by multiple local governments as authorized in individual nutrient strategy rules."

.0703(b)(5) – This rule provision uses the term "in-water nutrient reduction projects." The term is undefined and its common meaning would seem to refer to a device like a solar bee. The NRCA requests the term "in-water" be removed from the rule. This rule exceeds the limitation established by NC Gen. Stat. §143-214.26(a)(2) as to geographic limitations and it appears to be in excess of the EMC's authority.

.0703(d)(1)(B) – The proposed restrictions of the use of lands that have been timbered for replanting in forest are harmful to removal of potential sources of substantial nutrient loading. They are also lands that are feasible for restoration to achieve nutrient offset credits. This set of restrictions should be removed from the rule. The Division has presented no scientific basis for this proposal and it appears for the first time in this version of the draft rules. The NRCA requests it be removed.

.0703(d)(1)(C) – It is lawful to make use of land in areas subject to nutrient strategies, except as otherwise regulated by the EMC. This restriction on the conversion of lawfully developed land to only the baseline status as forest lands will remove incentives to recover lands to forest status which have been altered with important nutrient impact. The Division has presented no scientific basis for this proposal and it appears for the first time in this version of the draft rules. The NRCA requests it be removed.

.0703(d)(8) – Previous nutrient credit projects which meet, or can be improved to meet, the requirements for the new status as a permanent credit should be allowed to make application and be approved as permanent credits. This provision punishes the entities which obtained the credits by making them purchase new credits when the 30 year period expires. The NRCA requests it be removed. NRCA members have needs for additional loading capacity now that cannot be met except by the purchase of nutrient offset credits. This proposal punishes anyone who buys credits between now and when a new rule goes into effect.

> Proposed revision: "(8) Nutrient offset credits that were approved prior to the adoption of this rule may make application to be reclassified. The Division shall approve the application of any bank to reclassify credits as permanent which meet the requirements for permanent credits at the time of the application to be reclassified. Other nutrient offset credits that were approved prior to the adoption of this rule or that were conditionally approved pursuant to a mitigation banking instrument or other agreement with DEQ prior to the adoption of this rule, are considered term credits and may be transferred between term and permanent ledgers at a ratio of 30 years of term nutrient offset credit to 1 (one) permanent nutrient offset credit.

.0703(e)(3) FINANCIAL ASSURANCES. – The last sentence of this rule infers that local governments must establish a mitigation bank for all nutrient offset credits even if they are being used internally by the local government to meet its regulatory requirements for nutrient loading reductions. The internal use of nutrient offset credits by a local government is outside the scope of NC Gen. Stat. §143-214.26. The NRCA requests that the last sentence of the proposed rule be removed. It reads: "Where the credits are generated by a locality, authority, utility, sanitation district, or permittee operating an MS4 or a permitted wastewater treatment facility, financial assurance may be provided through its existing tax or rate authority."

.0703(i)(4) NUTRIENT OFFSET CREDIT TRANSACTIONS. This proposed rule is concerned with whether a ratio greater than 1:1 should be applied when nutrient offset credits from a nonpoint source are used by a point source. The body of the provision misstates the Trading Policy adopted by EPA in 2003. As presented, the proposed rule states that EPA always requires a ratio at least 1:1.2. That is incorrect, the EPA policy reads:

> EPA supports a number of approaches to compensate for nonpoint source uncertainty. These include monitoring to verify load reductions, the use of greater than 1:1 trading ratios between nonpoint and point sources, using demonstrated performance values or conservative assumptions in estimating the effectiveness of nonpoint source management practices, using site- or trade-specific discount factors, and retiring a percentage of nonpoint source reductions for each transaction or a predetermined number of credits. Where appropriate, states and tribes may elect to establish a reserve pool of credits that would be available to compensate for unanticipated shortfalls in the quantity of credits that are actually generated.

Accordingly, the EMC should refuse to send the presently proposed options to notice. Instead, it recognizes that the science of quantifying the value of SCM reductions has greatly advanced and that the purposes of the prior limitations are no longer an appropriate basis for a rule provision as proposed by DWR. Instead, it should use the language in the draft rule .0713(7)(b) and (8)(d). The proposal is included in the following language:

> For offset credits used to meet the discharge requirements, the applicant shall provide 10% additional credits to address the uncertainty factor for using unmonitored nonpoint source

reductions to meet point source discharge limits. For offset credits used to meet the discharge requirements, the applicant shall provide no additional credits to address the uncertainty factor for using monitored nonpoint source reductions to meet point source discharge limits.

In Commented [A21], DWR misstates that national norm as it regards the 1:2 ratio. The only other place that uses the ratio is the State of Virginia for the Chesapeake Bay. Maryland uses no uncertainty ratioThe most comprehensive look at this issue was done as a part of report by the National Network on Water Quality Trading in 2015. Chapter 5 of the report discusses this issue. it is attached. Section 5.1.1 discusses the Uncertainty Ratio, and reads:

> "Not all trading programs have uncertainty ratios applied to nonpoint source credit estimation. When determining where (or whether) to set the uncertainty ratio, programs should consider the degree of uncertainty introduced through nonpoint source pollution reduction estimations and whether that uncertainty is, in part, already compensated from through conservative estimation factors, direct monitoring, or other means. The U.S. EPA Water Quality Trading Policy states that it supports a number of approaches to compensate for scientific uncertainty associated with estimating nonpoint source load reductions, including monitoring, trading rations of greater than 1:1, use of conservative performance values, trade-specific discount factors, retirement ratios and reserve ratios. Different uncertainty ratios could be used for different types of practices and/or trades. Similarly, some management practices may have less uncertainty associated with them because their impacts are better understood and can be more accurately estimated."
>
> Building a Water Quality Trading Program: Options and Considerations, pp 80-81.

In addition, this proposed rule does not exclude from its coverage the existing Falls rule which allows a local government to consolidate its point source reductions and nonpoint source reductions into a single budget for compliance purposes. That rule has no ratio to be applied when nonpoint source reductions are used to meet the point source reduction requirements. See 15A NCAC 2B .0282(4). The EMC will exceed its authority it amends the Falls rules with this provision.

(4) Local governments have the option of combining their reduction needs from NPDES dischargers assigned allocations in 15A NCAC 02B .0279 and existing development as described in 15A NCAC 02B .0278, including loads from properly functioning and malfunctioning septic system and

discharging sand filters, into one reduction and allocation requirement and meet them jointly.

APPENDIX B: PROPOSED RULE AMENDMENTS

15A NCAC 02B .0229.0733TAR-PAMLICO NEW AND EXPANDING WASTEWATER DISCHARGER REQUIREMENTS ~~RIVER BASIN - NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: NUTRIENT OFFSET PAYMENTS FOR NON-TAR-PAMLICO BASIN ASSOCIATION MEMBERS~~

(1) Purpose. The purpose of this Rule is to establish minimum nutrient control requirements for new and expanding point source discharges in the Tar-Pamlico River Basin in order to maintain or restore water quality in the Pamlico Estuary and protect its designated uses.

~~(a) All waters of the Tar-Pamlico River Basin have been supplementally classified nutrient sensitive waters (NSW) pursuant to 15A NCAC 2B .0223. The following procedures are to be implemented in accordance with 15A NCAC 2B .0223 in all waters of the Tar-Pamlico River Basin for those wastewater dischargers who are not members of the Tar-Pamlico Basin Association;~~

~~(b) Existing wastewater dischargers expanding to greater than 0.5 million gallons per day (MGD), who are not members of the Tar-Pamlico Basin Association, shall be required to offset their additional nutrient loads by funding nonpoint source control programs approved by the Division of Water Quality prior to the issuance of their NPDES permit and at each renewal. Nitrogen and phosphorus loads shall be offset at the rate of 110 percent of the cost to implement BMPs designed to reduce that same load created by expanding the discharge above 0.5 MGD. Equations for calculating the offset costs are:~~

(2) Applicability. This Rule applies to all discharges from wastewater treatment facilities in the Tar-Pamlico River Basin that receive nitrogen- or phosphorus-bearing wastewater and are required to obtain individual NPDES permits.

(3) Definitions. The terms used in this Rule shall be as defined in Rule 02B .0701 and as follows:

(a) In regard to point source dischargers, treatment facilities, wastewater flows or discharges, or like matters:

(i) "Existing" means that which obtained an NPDES permit on or before December 8, 1994.

(ii) "Expanding" means that which increases beyond its permitted flow as defined in this Rule.

(iii) "New" means that which had not obtained an NPDES permit on or before December 8, 1994.

~~(1) For an existing facility with permitted flow of less than or equal to 0.5 MGD as of December 8, 1994 expanding to greater than 0.5 MGD who is not a member of the Tar-Pamlico Basin Association:~~

Commented [A1]: Change: This Rule has been revised to treat new and expanding wastewater dischargers in the Tar-Pamlico Basin in the same manner as facilities in the Neuse Basin.

Effect: Replaces fixed BMP rate for offsets and follows the process establish in the Nutrient Offset Rule .0703.

~~Payment=((PF$_e$ x (TN+TP) x 1384)-(0.5 x (TN+TP) x 1384)) x (BMP$_c$ x 1.1) where:~~

~~Payment = the nutrient offset payment ($);~~

~~PF$_e$ = Permitted Flow including expansion (MGD);~~

~~TN = 6 mg/l total nitrogen for domestic discharges or BAT for industrial discharges;~~

~~TP = 1 mg/l total phosphorus for domestic discharges or BAT for industrial discharges;~~

~~1384 = conversion factor;~~

~~0.5 = the permitted flow (MGD) above which payment for additional nutrient loading is required;~~

~~BMP$_c$ = Best Management Practice cost-effectiveness rate in $/kg as set in 15A NCAC 2B .0237 of this Section;~~

~~1.1 = 110 percent of the cost for the nonpoint source controls.~~

(4) This Item specifies nutrient controls for new facilities.

(a) Proposed new wastewater dischargers shall evaluate all practical alternatives to surface water discharge and report their findings pursuant to 15A NCAC 02H .0105(c)(2).

(b) The nitrogen and phosphorus discharge limits for a new facility shall not exceed loads equivalent to its active allocation and offset credit, or the applicable technology-based mass limit, whichever are less, for each nutrient. Technology-based limits are as follows:

(i) for facilities treating municipal or domestic wastewaters, the mass load equivalent to a concentration of 3.0 mg/L TN and 0.5 mg/L TP at the monthly average flow limit in the facility's NPDES permit; and

(ii) for facilities treating industrial wastewater, the mass load equivalent to the best available technology economically achievable or a discharge concentration of 3.2 mg/L TN and 0.5 mg/L TP at the monthly average flow limit in the facility's NPDES permit, whichever is less.

(c) Proposed new dischargers submitting an application shall acquire nutrient allocation from existing dischargers or nutrient offset credits pursuant to 15A NCAC 02B .0703, Nutrient Offset Trading Program, or both, for the mass load dictated by this Item. The allocation and offset credits shall be sufficient for a period of no less than 10 years of discharge at the proposed design flow rate. Payment for no less than 10 years' allocation and credits shall be made in full

prior to the ensuing permit issuance, except that the Director may allow up to 20 years for payment if the applicant provides sufficient financial assurance that it can make such payment per G.S. 143-215.1(b)(4)(b).

(d) No application for a new discharge shall be made or accepted without written documentation demonstrating that the requirements of Sub-Items (b) and (c) of this Item have been met.

(e) Subsequent applications for permit renewal shall demonstrate that the facility has sufficient nitrogen allocation or offset credits to meet its effluent nutrient limitations for at least 10 years beyond the requested renewal. See 15A NCAC 02H .0112(c).

(f) The director shall establish more stringent limits for nitrogen or phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.

(5) This item specifies nutrient controls for expanding facilities.

(a) Facilities proposing expansion shall evaluate all practical alternatives to surface water discharge and report their findings pursuant to 15A NCAC 02H .0105(c)(2).

(b) The nitrogen and phosphorus discharge limits for an expanded facility shall not exceed loads equivalent to its active allocation and offset credit, or the applicable technology-based mass limit, whichever is less, for each nutrient. Technology-based limits are as follows:

(i) for facilities treating municipal or domestic wastewaters, the mass equivalent to a concentration of 3.0 mg/L TN and 0.5 mg/L TP at the monthly average flow limit in the NPDES permit; and

(ii) for facilities treating industrial wastewater, the mass load equivalent to the best available technology economically achievable or a discharge concentration of 3.2 mg/L TN and 0.5 mg/L TP at the monthly average flow limit in the facility's NPDES permit, whichever is less.

(c) Facilities submitting application for increased discharge or, where an existing permit contains tiered flow limits, for authorization to operate at an increased flow, shall acquire nutrient estuary allocation from existing dischargers or purchase nutrient offset credits pursuant to Rule 02B .0703, Nutrient Offset Trading Program, or both, for the proposed discharge above 0.5 million gallons per day (MGD). The allocation and offset credits shall be sufficient for no less than 10 years of discharge at the proposed design flow rate. Payment for no less than 10 years' allocation and credits shall be made in full prior to the ensuing permit issuance, except that the Director

may allow up to 20 years for payment if the applicant provides sufficient financial assurance that it can make such payment per G.S. 143-215.1(b)(4)(b).

(d) No application for an expanding facility shall be made or accepted without written documentation demonstrating that the requirements of Sub-Items (a) through (c) of this Item have been met.

(e) The director shall not issue a permit authorizing expansion of an existing facility unless the applicant has satisfied the requirements of Sub-Item (d). If a facility's permit contains tiered flow limits for expansion, the director shall not issue an authorization to operate at an increased flow unless the applicant has satisfied the requirements of Sub-Item (d).

Commented [A2]: Technical corrections: deleted duplicate text in (c) and corrected internal references in (d) and (e).

(f) Subsequent applications for permit renewal shall further demonstrate that the facility has sufficient means to meet its effluent nutrient limitations for at least ten years beyond renewal. See 15A NCAC 02H .0112(c).

(g) The director shall establish more stringent limits for nitrogen or phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.

(h) Existing wastewater dischargers expanding to greater than 0.5 MGD design capacity may petition the Commission or its designee for an exemption from Sub-Items (a)-(g) of this Item upon meeting and maintaining all of the following conditions:

(i) The facility has reduced its annual average TN and TP loading by 30 percent from its annual average 1991 TN and TP loading. Industrial facilities may alternatively demonstrate that nitrogen and phosphorus are not part of the waste stream above background levels.

(ii) The expansion does not result in annual average TN or TP loading greater than 70 percent of the 1991 annual average TN or TP load. Permit limits may be established to ensure that the 70 percent load is not exceeded.

~~(2) For an expanding facility with a permitted flow of greater than or equal to 0.5 MGD as of December 8, 1994 who is not a member of the Tar-Pamlico Basin Association:~~

~~Payment=((PF$_e$ x (TN+TP) x 1384) (PF x (TN+TP) x 1384)) x (BMP$_c$ x 1.1) where:~~

~~Payment = the nutrient offset payment ($);~~

~~PF$_e$ = Permitted Flow including expansion (MGD);~~

~~PF = Permitted Flow as of December 8, 1994 (MGD);~~

~~TN = 6 mg/l total nitrogen for domestic discharges or BAT for industrial discharges;~~

~~TP = 1 mg/l total phosphorus for domestic discharges or BAT for industrial discharges;~~

~~1384 = conversion factor;~~

~~BMP_c = Best Management Practice cost-effectiveness rate in $/kg as set in 15A NCAC 2B .0237 of this Section;~~

~~1.1 = 110 percent of the cost for the nonpoint source controls.~~

~~(c) New wastewater dischargers with permitted flows greater than or equal to 0.05 MGD, who are not members of the Tar-Pamlico Basin Association, shall be required to offset their nutrient loads by funding nonpoint source control programs approved by the Division of Water Quality prior to the issuance of their NPDES permit and at each renewal. Nitrogen and phosphorus loads shall be offset at the rate of 110 percent of the cost to implement BMPs designed to reduce that same loading created by the new discharge above 0.05 MGD. The equation for calculating the offset costs is:~~

~~Payment = PF x (TN+TP) x 1384 x (BMP_c x 1.1) where:~~

~~Payment = the nutrient offset payment ($);~~

~~PF = Permitted Flow (MGD);~~

~~TN = 6 mg/l total nitrogen for domestic discharges or BAT for industrial discharges;~~

~~TP = 1 mg/l total phosphorus for domestic discharges or BAT for industrial discharges;~~

~~1384 = conversion factor;~~

~~BMP_c = Best Management Practice cost-effectiveness rate in $/kg as set in 15A NCAC 2B .0237 of this Section;~~

~~1.1 = 110 percent of the cost for the nonpoint source controls.~~

~~(d) Existing wastewater dischargers expanding to greater than 0.5 MGD, who are not members of the Tar-Pamlico Basin Association, may petition the Commission or its designee for an exemption from Paragraph (b) of this Rule upon meeting all of the following conditions:~~

~~(1) For industrial facilities:~~

~~(A) The facility has reduced its annual average TN loading by 30 percent from its annual average 1991 TN loading or nitrogen is not part of the waste stream above background levels;~~

~~(B) The facility has reduced its annual average TP loading by 30 percent from its annual average 1991 TP loading or phosphorus is not part of the waste stream above background levels;~~

~~(C) The expansion does not result in annual average TN loading greater than 70 percent of the 1991 annual average TN load. Permit limits may be established to insure that the 70 percent load is not exceeded;~~

~~(D) The expansion does not result in annual average TP loading greater than 70 percent of the 1991 annual average TP load. Permit limits may be established to insure that the 70 percent load is not exceeded;~~

~~(E) To maintain its exemption from Paragraph (b) of this Rule, a facility must continue to meet the requirements of Subparagraph (d)(1) Parts (A) through (D) of this Rule.~~

~~(2) For municipal facilities:~~

~~(A) The facility has reduced its annual average TN loading by 30 percent from its annual average 1991 TN loading;~~

~~(B) The facility has reduced its annual average TP loading by 30 percent from its annual average 1991 TP loading;~~

~~(C) The expansion does not result in annual average TN loading greater than 70 percent of the 1991 annual average TN load. Permit limits may be established to insure that the 70 percent load is not exceeded;~~

~~(D) The expansion does not result in annual average TP loading greater than 70 percent of the 1991 annual average TP load. Permit limits may be established to insure that the 70 percent load is not exceeded;~~

~~(E) To maintain its exemption from Paragraph (b) of this Rule, a facility must continue to meet the requirements of Subparagraph (d)(2) Parts (A) through (D) of this Rule.~~

History Note: *Authority G.S. 143-214.1; 143-215.1; 143-215.3(a)(1); 143B-282(a)-(d); S.L. 1997-458;*

Eff. April 1, 1997.

Amended Eff. [New Date].

15A NCAC 02B .0232 is proposed for amendment as follows:

15A NCAC 02B ~~.0232~~ .0710 NEUSE NUTRIENT STRATEGY: PURPOSE AND SCOPE ~~NEUSE RIVER BASIN-NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: BASIN NUTRIENT REDUCTION GOAL~~

~~(a) PURPOSE. The purpose of this Rule and Rules 15A NCAC 02B .0711 through .0715 of this Section is to attain the designated uses of the Neuse River estuary with respect to meeting nutrient-related water quality standards pursuant to the Environmental Management Commission's authority under the Clean Water Responsibility and Environmentally Sound Policy Act enacted by the North Carolina General Assembly in 1997 and other authorities. All waters of the Neuse River Basin are supplementally classified as Nutrient Sensitive Waters (NSW) pursuant to 15A NCAC 2B .0223. The rules enumerated in Paragraph (d) of this Rule together constitute the Neuse nutrient strategy, and shall be implemented in accordance with 15A NCAC 02B .0223. This rule establishes the framework of the Neuse nutrient strategy.~~ Pursuant to 1995 (Reg. Sess., 1996) N.C. Session Laws, c. 572, the Environmental Management Commission hereby establishes the goal of reducing the average a nnual load of nitrogen delivered to the Neuse River Estuary from point and nonpoint sources by a minimum of 30 percent of the average annual load for the period 1991 through 1995 by the year 2001. All waters of the Neuse River Basin have been supplementally classified as Nutrient Sensitive Waters (NSW) pursuant to 15A NCAC 2B .0223. The following rules shall be implemented in accordance with 15A NCAC 2B .0223 in all waters of the Neuse River Basin:

~~(b) SCOPE AND LIMITATION. The Neuse nutrient strategy rules require controls to reduce nitrogen loads from significant sources of this nutrient throughout the Neuse Basin. These Rules do not address sources for which there is insufficient scientific knowledge to base regulation. The Commission may undertake additional rulemaking in the future or make recommendations to other rulemaking bodies as deemed appropriate to more fully address nutrient sources to the Neuse River Estuary.~~

~~(c) GOAL. To achieve the purpose of the Neuse nutrient strategy, the Commission established in the initial Neuse nutrient strategy rules, enacted in August 1998, the goal of reducing the average annual load of nitrogen delivered to the Neuse estuary from point and nonpoint sources by a minimum of 30 percent below the average annual load for the period 1991 through 1995 and thereafter maintaining it at or below that level. This amended strategy continues that goal.~~

Commented [A3]: Change: Updated rule references and added clarifying language to better explain the purpose of the rules to achieve nutrient related water quality standards in the Neuse estuary.

Effect: Improved clarity. No impact on implementation.

Commented [A4]: Note: Statement on what sources are addressed under the rules and the Commissions ability to undertake additional rulemaking.

Effect: No Impact

Commented [A5]: Change: Moved and clarified goals language addressing the overall strategy nitrogen reduction goal from Paragraph (a)

Effect: No Impact

~~(d) RULES ENUMERATED. The rules of the Neuse nutrient strategy, in addition to this one, are titled as follows:~~

~~(1) Rule .0233 for protection and maintenance of riparian areas,~~

~~(2) Rule .0234 for wastewater discharges,~~

~~(3) Rule .0235 for urban stormwater management,~~

~~(4) Rules .0236 and .0238 for agricultural nitrogen reduction,~~

~~(5) Rule .0239 for nutrient management, and~~

~~(6)~~(5) Rule .0240 for nitrogen offset fees.~~fees; and~~

~~(6) Rules .0241 and .0295 for riparian buffer and mitigation.~~

(1) Rule .0711 for urban stormwater management,

(2) Rule .0712 for agriculture,

(3) Rule .0713 for wastewater discharges,

(4) Rule .0714 for riparian buffer protection, and

(5) Rule .0715 for riparian buffer program delegation

(e) ADAPTIVE MANAGEMENT. Given ongoing impairment of the Neuse estuary more than a decade after full implementation of the above rules, the Division is pursuing fuller evaluation of the basin's nutrient dynamics to inform and guide adaptive management. Evaluation shall seek to utilize all sources of available information, including stakeholder input, and shall consider drivers, character and shifts in the impairment with time, trends and character of loading delivered to the estuary, and distribution and character of loading inputs to the basin and changes to those inputs over time. Evaluation shall address the extent to which the reduction goals identified above have been achieved and shall, based on its findings, provide recommendations on management needs. The Division shall seek to complete an evaluation within three years of the effective date of this rule and shall distribute its findings, which may recommend regulatory and non-regulatory actions, upon completion. The Division shall also report biannually to the Water Quality Committee of the Commission on implementation progress and reductions achieved by sources subject to the Neuse nutrient strategy. The adaptive management approach is based on defined goals, knowledge of resources and impacts to those resources, appropriate technology

Commented [A6]: Change: Provides updated Rule References to point to new .0700 Rule numbers

Effect: Points to new .0700 Rule Numbers

Commented [A7]: Change: Added adaptive management language recognizing the ongoing water quality issues in the estuary and the availability of more information to evaluate implementation as time goes on. Establishes date by which evaluation would be completed and recommendations made. Added requirement for Division to report to the WQC biannually on implementation progress.

Effect: Provides for better tracking of progress and ability for management strategy to be modified based on evaluation of additional data and strategy effectiveness.

and inventory. These inputs are used to plan, act, monitor and evaluate. The process is iterative and the goal is continuous environmental quality improvement.

(f) GEOGRAPHIC APPLICABILITY. The Neuse nutrient strategy shall apply in all areas draining to NSW waters within the Neuse River Basin unless individual Neuse strategy rules describe other boundaries.

(b)~~(g) PENALTIES. Failure to meet requirements of the Neuse nutrient strategy~~ Rules .0233, .0234, .0235, .0236, .0238, .0239, and .0240 .0240. and .0295 of this Section ~~may result in imposition of enforcement measures as authorized by G.S. 143-215.6A (civil penalties), G.S. 143-215.6B (criminal penalties), and G.S. 143-215.6C (injunctive relief).~~

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.1; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; S.L. 1995-576; S.L. 1997-458;143-215.8B; 143B-282(a)-(d).*

Eff. August 1, 1998.

Amended Eff. [New Date].

Commented [A8]: Change: Clarified geographic area to which the Neuse nutrient strategy rules apply.

Effect: No Impact

Commented [A9]: Change: Removed unnecessary rule references and simplified language to refer to the collective Neuse nutrient strategy.

Effect: Improved Clarity. No Impact.

15A NCAC 02B ~~.0234~~ .0713NEUSE RIVER BASIN - NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: WASTEWATER DISCHARGEREQUIREMENTS

The following is the National Pollutant Discharge Elimination System (NPDES) wastewater discharge management strategy for the Neuse River Basin:

(1) Purpose. The purpose of this Rule is to establish minimum nutrient control requirements for the point source discharges in the Neuse River Basin in order to maintain or restore the water quality in the Neuse River Estuary and protect its designated uses.

(2) Applicability. This Rule applies to all discharges from wastewater treatment facilities in the Neuse River Basin that receive nitrogen-bearing wastewater and are required to obtain individual NPDES permits. Discharges in the Falls Lake watershed are subject to additional nutrient control requirements under the Falls Water Supply Nutrient Strategy, Rules 02B .0275 et seq.

(3) Definitions. For the purposes of this Rule, the following definitions apply:

(a) In regard to point source dischargers, treatment facilities, wastewater flows or discharges, or like matters:

(i) "Existing" means that which obtained a NPDES permit on or before December 31, 1995.

(ii) "Expanding" means that which increases beyond its permitted flow as defined in this Rule.

(iii) "New" means that which had not obtained a NPDES permit on or before December 31, 1995.

(b) "MGD" means million gallons per day.

(c) "Nitrogen wasteload allocation" is that portion of the Neuse River nitrogen TMDL assigned to individually permitted wastewater facilities in the basin and represents the maximum allowable load of total nitrogen to the estuary from these point source dischargers.

(d) "Nitrogen estuary allocation" or "estuary allocation" means the mass loading of total nitrogen at the estuary that is reserved for a discharger or group of dischargers. A discharger's or group's

estuary allocation is equivalent to its discharge allocation multiplied by its assigned transport factor.

(e) "Nitrogen discharge allocation" or "discharge allocation" means the mass loading of total nitrogen at the point(s) of discharge that is reserved for a discharger or group of dischargers. A discharger's or group's discharge allocation is equivalent to its estuary allocation divided by its assigned transport factor.

(f) "Nitrogen TMDL," or "TMDL," means the total nitrogen load to the Neuse River estuary that is predicted to maintain adequate water quality to support all designated uses in the estuary and is approved by the United States Environmental Protection Agency in accordance with the federal Clean Water Act.

(g) "Nonpoint source load allocation" is that portion of the Neuse River nitrogen TMDL assigned to all other nitrogen sources in the basin other than individually permitted wastewater facilities and represents the maximum allowable load of total nitrogen to the estuary from these nonpoint sources.

(h) "Permitted flow" means the maximum monthly average flow authorized in a facility's NPDES permit as of December 31, 1995, with the following exceptions:

Facility Name	NP	Permitted Flow (MGD)
Benson	NC	3.00
Goldsboro	NC	16.80
Kenly	NC	0.63
Snow Hill	NC	0.50
Wilson	NC	14.00

(i) "Total nitrogen" means the sum of the organic, nitrate, nitrite, and ammonia forms of nitrogen.

(j) "Transport factor" is the fraction of the total nitrogen in a discharge that is predicted to reach the estuary.

(4) This Item specifies the nitrogen wasteload allocation for point sources.

(a) ~~Beginning~~ In accordance with the ~~calendar year 2003~~, Nitrogen TMDL for the Neuse River estuary, approved in ~~1999~~ 2001 by the USEPA, the nitrogen wasteload allocation for point sources shall not exceed 1.64 million pounds per calendar year. The nitrogen wasteload allowance for point sources shall not exceed the nitrogen wasteload allocation plus ~~any portion of the nonpoint source load allocation purchased in accordance with the provisions in Items (7) and (8)of this Rule and 15A NCAC 02B.0240~~.nutrient offset credits obtained in accordance with G.S. 143-214.26.

(b) The Commission shall order future revisions in the nitrogen wasteload allocation whenever changes to the TMDL establish reductions in the allocations to point sources are necessary to ensure that water quality in the estuary meets all applicable standards in 15A NCA C 02B.0200 or to conform with applicable state or federal requirements.

(5) This Item specifies the initial distribution of nitrogen discharge allocations for point sources ~~as set forth in the Nitrogen TMDL~~.

(a) ~~Upon adoption of this Rule and until~~ Until revised as provided elsewhere in this Rule, thefollowing group and individual discharge allocations for total nitrogen shall apply in order to comply with the nitrogen wasteload allocation for point sources in Item (4) of this Rule:

(i) Dischargers with permitted flows less than 0.5 MGD shall be assigned collectively an annual discharge allocation of 138,000 pounds of total nitrogen.

(ii) Dischargers upstream of Falls Lake Dam and with permitted flows greater than or equal to 0.5 MGD shall be assigned collectively an annual discharge allocation of 443,700 pounds of total nitrogen.

(iii) Municipal dischargers downstream of Falls Lake Dam and with permitted flows greater than or equal to 0.5 MGD shall be assigned collectively an annual discharge allocation of 2,021,400 pounds of total nitrogen.

(iv) Industrial dischargers downstream of Falls Lake Dam and with permitted flows greater than or equal to 0.5 MGD shall be assigned collectively an annual discharge allocation of 396,900 pounds of total nitrogen.

(v) Within each group in Sub-Items (i) - (iv) of this Item, each individual discharger shall be assigned an individual discharge allocation and the equivalent estuary allocation. Each discharger's discharge allocation shall be calculated as

its permitted flow divided by the total permitted flow of the group, multiplied by the group discharge allocation.

(b) In the event that the nitrogen TMDL and its wasteload allocation for point sources is revised, as provided in Item (4) of this Rule, the Commission shall apportion the revised load among the existing facilities and shall revise discharge allocations as needed. The Commission may consider such factors as:

(i) fate and transport of nitrogen in the river basin;

(ii) technical feasibility and economic reasonableness of source reduction and treatment methods;

(iii) economies of scale;

(iv) nitrogen control measures already implemented;

(v) probable need for growth and expansion;

(vi) incentives for responsible planning, utilities management, resource protection, and cooperative efforts among dischargers; and

(vii) other factors the Commission deems relevant.

(6) This Item specifies nutrient controls for existing facilities.

(a) Beginning with calendar year 2003, each discharger with a permitted flow equal to or greater than 0.5 MGD shall be subject to a total nitrogen permit limit equal to its individual discharge allocation, pursuant to Item (5) of this ~~Rule~~ Rule, adjusted to reflect any subsequent allocation or nutrient offset credits pursuant to the rules of the Neuse River nutrient management strategy.

(b) Effective January 1, 2003, dischargers shall be subject to the following limits for total phosphorus:

~~(i) All existing facilities above Falls Lake Dam with permitted flows greater than or equal to 0.05 MGD shall meet a quarterly average total phosphorus limit of 2 mg/L.~~

(ii) All existing facilities below Falls Lake Dam with permitted flows greater than or equal to 0.5 MGD shall meet a quarterly average total phosphorus limit of 2 mg/L.

(c) The director shall establish more stringent limits for nitrogen or phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.

(7) This Item specifies nutrient controls for new facilities.

(a) New facilities proposing to discharge wastewater shall evaluate all practical alternatives to surface water ~~discharge,~~discharge and report its findings pursuant to 15A NCAC 02H ~~.0105(c)(2), prior to submitting an application to discharge~~ .0105(c)(2).

(b) New facilities submitting an application shall ~~make every reasonable effort to obtain~~ acquire, or demonstrate contractual agreement to acquire, nitrogen estuary allocation ~~for the proposed wastewater discharge~~ from existing ~~dischargers. If estuary allocation cannot be obtained from the existing facilities, new facilities may purchase a portion of the nonpoint source load allocation~~ dischargers or nitrogen offset credits pursuant to G.S. 143-214.26, or both for the proposed discharge. The allocation and offset credits shall be sufficient for a period of ~~30~~ no less than 10 years of discharge at

the proposed design flow rate. ~~at a rate of 200 percent of the cost as set in 15A NCAC 02B .0240 to implement practices designed to offset the loading created by the new facility.~~ Payment for ~~each 30 year portion of the nonpoint source load~~ no less than 10 years' allocation and credits shall be made in full prior to the ensuing permit ~~issuance.~~ issuance, except that the Director may allow up to 20 years for payment if the applicant provides sufficient financial assurance that it can make such payment per G.S. 143-215.1(b)(4)(b). For offset credits used to meet the discharge requirements, the applicant shall provide 10% additional credits to address the uncertainty factor for using unmonitored nonpoint source reductions to meet point source discharge limits. For offset credits used to meet the discharge requirements, the applicant shall provide no additional credits to address the uncertainty factor for using monitored nonpoint source reductions to meet point source discharge limits.

(c)

(d) No application for a new discharge shall be made or accepted without written documentation demonstrating that the requirements of Sub-Items (a) and (b) of this Item have been met.

(e) The nitrogen discharge ~~allocation~~ limit for a new facility ~~treating~~ shall not exceed the nitrogen load equivalent to its active allocation and offset credits, or the applicable technology-based mass limit, whichever is less. Technology-based limits are as follows:

(i) For facilities treating municipal or domestic ~~wastewaters shall not exceed~~ wastewaters, the mass load equivalent to a concentration of 3.5 mg/L at the ~~maximum~~ monthly average flow limit in the facility's NPDES ~~permit.~~ permit; and

(ii) ~~The nitrogen discharge allocation for a new facility~~ For facilities treating industrial ~~wastewaters shall not exceed~~ wastewaters, the mass load equivalent ~~of~~ to either the best available technology economicaly achievable or a discharge concentration of 3.2 mg/L at the ~~maximum~~ monthly average flow limit in the facility's NPDES permit, whichever is less.

(f) Subsequent applications for permit renewal shall demonstrate that the facility has sufficient nitrogen allocation or offset credits to meet its effluent nutrient limitations for at least 10 years beyond the requested renewal. See 15A NCAC 02H.)112(c).

(g) New dischargers ~~must~~ shall meet a monthly average total phosphorous limit of ~~1~~ 10 mg/L.

(h) The director shall establish more stringent limits for nitrogen or phosphorus upon findingthat such limits are necessary to protect water quality standards in localized areas.

(8) This Item specifies nutrient controls for expanding facilities.

(a) Expanding facilities shall evaluate all practical alternatives to surface water ~~discharge,~~discharge and report its findings pursuant to 15A

NCAC 02H ~~.0105(c)(2), prior to submitting an application to discharge~~ .0105(c)(2)..

(b) Facilities submitting an application for increased discharge shall make every reasonable effort to minimize increases in their nitrogen discharges, such as by reducing sources of nitrogen to the ~~facility or increasing the nitrogen treatment capacity of the facility; or to obtain estuary allocation from existing dischargers.~~ facility.

~~(c) No application for an expanding facility shall be made or accepted without written documentation demonstrating that the requirements of Sub-Items (a) and (b) of this Item have been met.~~

(d) ~~If these measures do not produce adequate estuary allocation for the expanded flows, facilities~~ Facilities submitting application for increased discharge or, where an existing permit contains tiered limits, for authorization to operate at an increased flow, ~~may purchase a portion of the nonpoint source load allocation.~~ shall acquire, or demonstrate contractual agreement to acquire, nitrogen allocation from existing dischargers or purchase nutrient offset credits pursuant to G.S. 143-214.26, or both, for the proposed discharge. The allocation and credits shall be sufficient for ~~a period of 30~~ 10 years of discharge at the proposed design flow rate. ~~at a rate of 200 percent of the cost as set in 15A NCAC 02B .0240 to implement practices designed to offset the loading created by the new facility.~~ Payment for ~~each 30-year portion of the nonpoint source load~~ allocation and credits shall be made in full prior to the ensuing permit ~~issuance.~~ issuance, except that the Director may allow up to 20 years for payment if the applicant provides sufficient financial assurance that it can make such payment per G.S. 143-215.1(b)(4)(b). For offset credits used to meet the discharge requirements, the applicant shall provide 10% additional credits to address the uncertainty factor for using unmonitored nonpoint source reductions to meet point source discharge limits. For offset credits used to meet the discharge requirements, the applicant shall provide no additional credits to address the uncertainty factor for using monitored nonpoint source reductions to meet point source discharge limits.

(d) No application for an expanding facility shall be made or accepted without written documentation demonstrating that the

requirements of Sub-Items (a) through (c) of this Item have been met.

(e) The director shall not issue a permit authorizing expansion of an existing facility unless the applicant has satisfied the requirements of Sub-Item (d). If a facility's permit contains tiered flow limits for expansion, the director shall not issue an authorization to operate at an increased flow unless the applicant has satisfied the requirements of Sub-Item (d).

(f) The nitrogen discharge ~~allocation~~ limit for an expanded facility shall not exceed the nitrogen load equivalent to its active allocation and offset credits, or the applicable technology-based mass limit, whichever is less. Technology-based limits are as follows:

(i) For facilities treating municipal or domestic ~~wastewaters shall not exceed~~ wastewaters, the mass equivalent to a concentration of 3.5 mg/L at the ~~maximum~~ monthly average flow limit in the NPDES ~~permit, or its existing allocation, whichever is greater.~~ permit; and

(ii) ~~The nitrogen discharge allocation for expanding~~ For facilities of an industrial ~~nature shall not exceed~~ nature, the mass equivalent to the best available technology economically achievable or a concentration of 3.2 mg/L at the ~~maximum~~ monthly average flow limit in the facility's modified NPDES permit, whichever is less. If the resulting mass value is less than the facility's existing discharge allocation, the existing discharge allocation shall not be reduced.

(g) Subsequent applications for permit renewal shall further demonstrate that the facility has sufficient means to meet its effluent nutrient limitations for at least ten years beyond renewal. See 15A NCAC 2H .0112(c).

(h) Expanding facilities must meet a monthly average total phosphorous limit of ~~1~~ 1.0 mg/L unless they are a member in good standing of a group compliance association described in Item (9) of this Rule, in which case they must meet a quarterly average total phosphorus limit of ~~2~~ 2.0 mg/L.

(i) The director shall establish more stringent limits for nitrogen or phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.

(9) This Item describes the option for dischargers to join a group compliance association to collectively meet nutrient load ~~allocations.~~ limits.

(a) Any or all facilities within the basin may form a group compliance association to meet nitrogen ~~estuary allocations~~ limits collectively. Any such association must apply for and shall be subject to an NPDES group permit that establishes the effective total nitrogen ~~allocations~~ limits, expressed as loads delivered to the estuary, for the association and for its members. More than one group compliance association may be established. No facility may belong to more than one association formed pursuant to this Rule at ~~a~~ any given time.

(b) No later than 180 days prior to coverage under a new NPDES group permit, or expiration of ~~the association~~ an existing group ~~NPDES~~ permit, the association and its members shall submit an application for ~~a~~ an NPDES permit for the discharge of total nitrogen to the surface waters of the Neuse River Basin. The NPDES group permit shall be issued to the association and its members as ~~co-permittees ("association NPDES permit"). It shall contain the association's estuary allocation and individual estuary allocations for each of the members.~~ co-permittees.

(c) An association's estuary ~~allocation~~ limit of total nitrogen shall be the sum of its members' individual estuary allocations and nutrient offset credits plus any other estuary allocation and offset credits obtained by the association or its ~~members.~~ members pursuant to this strategy.

(d) An association and its members may reapportion ~~the~~ their individual estuary allocations and nutrient offset credits ~~of its members~~ on an annual basis. The ~~association~~ NPDES group permit shall be modified to reflect the revised individual estuary ~~allocations.~~ allocations and limits.

(e) ~~Beginning in calendar year 2003, if~~ If an association does not meet its estuary ~~allocation~~ limit in any year, itshall ~~make offset payments for nonpoint source controls~~ obtain nutrient offset credits in accordance with G.S. 143-214.26 to offset its mass exceedance no later than May 1 of the following ~~year at the rate set in 15A NCAC 02B .0240~~ year.

(f) Association members shall be ~~exempted from~~ deemed compliant with the permit limits for total nitrogen contained in their individually issued NPDES permits ~~so long as~~ while they remain members in an association. Association members shall be ~~exempted from~~ deemed compliant with their individual estuary ~~allocations~~ limits in the ~~association~~ NPDES group permit ~~as long as~~ in any year in which the association is in compliance with its estuary ~~allocation~~ limit. If the association ~~fails to meet its estuary allocation~~ exceeds its group limit, the association and ~~the~~ any

members that ~~have failed to meet~~ exceed their individual estuary ~~allocations~~ limits in the ~~association~~ NPDES group permit ~~will~~ shall be deemed to be out of compliance with the ~~association NPDES~~ group permit.

(10) ~~Regional Facilities. In the event that an existing~~ If an NPDES-permitted discharger or group of dischargers accepts wastewater from another NPDES-permitted treatment facility in the Neuse River Basin and that acceptance results in the elimination of the discharge from the treatment facility, the eliminated facility's total nitrogen estuary allocation shall be transferred and added to the accepting discharger's estuary allocation.

History Note: Authority G.S. 143-214.1; 143-215; 143-215.1; 143-215.3(a)(1); S.L. 1995, c. 572;

Temporary Adoption Eff. January 22, 1998;

Eff. August 1, 1998;

Temporary Amendment Eff. March 15, 2000; Temporary Amendment Expired on December 10, 2000; Amended Eff. April 1, 2003.

15A NCAC 02B .0235 is proposed for amendment as follows:

15A NCAC 02B ~~.0235~~ .0711 NEUSE ~~RIVER BASIN~~ NUTRIENT ~~SENSITIVE WATERS MANAGEMENT~~ STRATEGY: ~~BASINWIDE~~ STORMWATER ~~REQUIREMENTS~~

~~The following is the urban stormwater management strategy for the Neuse River Basin:~~

~~(1) PURPOSE. The purpose of this Rule is to achieve and maintain the nitrogen loading reduction goal established for the Neuse River Estuary in Rule .0710 of this Section from an undeveloped condition on lands in the Neuse River Basin on which new development occurs. Nothing in this Rule preempts the requirements of 15A NCAC 02B .0277 for projects subject to the Falls Reservoir Nutrient Strategy or prevents local governments from implementing requirements that are more restrictive than those set forth in this Rule.~~

(1)(2) APPLICABILITY. The following local governments are designated, based on population and other factors, as parties responsible for implementing stormwater management requirements as part of the Neuse River Nutrient Sensitive Waters stormwater management strategy: shall implement the stormwater management requirements of this Rule. Municipalities shall implement this rule throughout their corporate limits and extraterritorial jurisdictions within the basin, while counties shall implement throughout their territorial jurisdictions within the basin. Counties named in this Item may implement this rule within municipalities not named in this Item in accordance with G.S. 160A-360(d).

Commented [A10]: Change: Added Purpose statement to clarify goal of this rule is to achieve reductions from new development. And point to the overall strategy reduction goals in Rule .0710. Given overlap of Falls and Neuse watershed geographic areas added statement that the requirements of the Falls Lake rules supersede those of the Neuse where applicable.

Effect: No substantive change. Improved clarity of rule purpose and interaction between Falls and Neuse rules.

Commented [A11]: Change: Provide a more detailed explanation of boundaries where the requirements of this rule apply within the municipality or county

Effect: Greater clarity. Ensure rule requirements implemented consistently geographically for all subject local governments. Adds flexibility for counties to work with municipalities not named in this rule to implement requirements allowing for greater coverage.

(a) Local governments designated under the original version of this Rule effective August 1998:

~~(a)~~(i) Cary,

~~(b)~~(ii) Durham,

~~(c)~~(iii) Garner,

~~(d)~~(iv) Goldsboro,

~~(e)~~(v) Havelock,

~~(f)~~(vi) Kinston,

~~(g)~~(vii) New Bern,

~~(h)~~(viii) Raleigh,

~~(i)~~(ix) Smithfield,

~~(j)~~(x) Wilson,

~~(k)~~(xi) Durham County,

~~(l)~~(xii) Johnston County,

~~(m)~~(xiii) Orange County,

~~(n)~~(xiv) Wake County, and

~~(o)~~(xv) Wayne County.

(b) The following additional local governments are subject to this Rule:

(i) Apex,

(ii) Clayton,

(iii) Fuquay Varina,

(iv) Greenville,

(v) Holly Springs,

Commented [A12]: Change: Added additional local governments to which the requirements of this rule shall apply based on assessment of growth by looking at overall populations and growth rate over the past 15 years. Added counties and municipalities with populations greater than 20K and 5K respectively that have a growth rate of approximately 200 or more people a year.

Effect: Improved coverage of rule requirements. Addresses holes in strategy coverage where larger and fast growing communities were previously left out of the original rule. These newly named local governments will be required to develop and adopt local programs including local ordinances to implement the rule requirements. Fiscal impact will be determined during the rulemaking process.

(vi) Knightdale,

(vii) Morrisville,

(viii) Rolesville,

(viii) Wake Forest,

(ix) Wendell,

(x) Winterville,

(xi) Craven County,

(xii) Greene County,

(xiii) Nash County,

(xiv) Pitt County, and

(xv) Wilson County.

(2) Other incorporated areas and other counties, not listed under Item (1) of this Rule, may seek to implement their own local stormwater management plan by complying with the requirements specified in Items (5) and (6) of this Rule.

(3) EXEMPTION. A stormwater management plan is not required for new development on an individual single-family lot if the new development meets the following criteria:

(a) It is not part of a larger common plan of development or sale; and

(b) The project does not result in greater than 5 percent built upon area on the lot or it is for purposes of a single-family residence on a lot 5 acres in size or greater.

~~(3) The Environmental Management Commission may designate additional local governments by amending this Rule based on their potential to contribute significant nutrient loads to the Neuse River. At a minimum, the Commission shall review the need for additional designations to the stormwater management program as part of the basinwide planning process for the Neuse River Basin. Any local governments that are designated at a later date under the Neuse Nutrient Sensitive Waters Stormwater Program shall meet the requirements under Items (5) and (6) of this Rule.~~

Commented [A13]: Change: Removed this provision as it is unnecessary since local governments already have this authority under session law 2006-246.

Effect: No Impact

Commented [A14]: Change: Provided exemption for individual single lot residential projects under a 5% BUA or of a certain size and not part of a larger common plan of development. Addition in response to stakeholder input and based on scenarios run using the latest accounting tool, projects meeting these criteria are assumed to already be meeting the required export rate targets.

Effect: Provides straightforward path for projects meeting these criteria to show compliance with the rule export targets without the cost of having to run export calculations and submitting a stormwater plan.

~~(4)~~(4) LOCAL PROGRAM IMPLEMENTATION REQUIREMENTS. All local governments subject to this rule shall implement stormwater management programs approved by the Commission ~~in March 2001~~ pursuant to the timeframes set out in Item (6) of this Rule, or any subsequent modifications to those plans approved by the Director, according to the following requirements and the standards contained in Item (5) of this Rule: ~~Local stormwater programs shall address nitrogen reductions for both existing and new development and include the following elements:~~

(a) ~~Review and approval of stormwater management plans for new developments to ensure that:~~The requirement for local government approval of a stormwater plan for all proposed new development projects disturbing one acre or more for single family and duplex residential property and recreational facilities, and one-half acre or more for commercial, industrial, institutional, multifamily residential, or local government property. Where proposed new development on an existing developed lot not part of a larger common plan of development results in built-upon area exceeding 24 percent, a stormwater plan addressing the new project area shall be required.

(b) A plan to ensure maintenance of stormwater control measures (SCMs) implemented to comply with this rule for the life of the development;

(c) A plan to ensure enforcement and compliance with the provisions in Item (5) of this Rule for the life of the development;

(d) A public education program to inform citizens how to reduce nutrient pollution and to inform developers about the nutrient requirements set forth in Item (5);

(e) A mapping program that includes major components of the municipal separate storm sewer system, waters of the State, land use types, and location of sanitary sewers; and

(f) A program to identify and remove illegal discharges.

(5) DEVELOPMENT PROJECT REQUIREMENTS. A proposed development project shall be approved by a subject local government for the purpose of this Rule when the applicable requirements of Item (4) and the following criteria are met. For development projects subject to the requirements of 15A NCAC 02B .0277 the requirements of this Item shall not apply.

~~(i)~~(a) The project area, as defined in 15A NCAC 02H .1002, shall meet either a nitrogen loading rate target of 3.6 pounds/acre/year or the definition of runoff volume match found in 15A NCAC 02H .1002. Except as otherwise stated in this Item, the project may meet the loading rate target through use of permanent nutrient offset credit pursuant to Rule

Commented [A15]: Change: Reorganized rule text to clearly state the requirements subject local governments must meet in their local implementation programs.

Effect: Provides clear separation between local government and developer requirements under the rule. Makes rule text current and clarifies that all local governments implementing programs continue to implement. Improved clarity. No substantive impact.

Commented [A16]: Change: Included land disturbance thresholds previously included in model program to provide information in one location.

Effect: Improved clarity and ease of finding information. No change in thresholds.

Commented [A17]: Change: Language added to address cumulative impacts in cases where small land disturbances add up over time to exceeded land disturbance thresholds that require a stormwater plan to be submitted.

Effect: Captures projects with cumulative impacts over land disturbance thresholds over time that would previously have been missed under the rule. Only requires the new BUA to be treated. Addresses loophole in previous rule language

Commented [A18]: Change: This language was moved up to this location from elsewhere in the rule.

Effect: Improved clarity concerning local government responsibilities.

Commented [A19]: Change: Reorganized this section to make it easier for the development community to identify the requirements their development projects need to meet.

Effect: Provides clear separation between local government and developer requirements under the rule. Improved Clarity.

Commented [A20]: Change: Updated this language to recognize there are multiple ways for a developer to meet runoff requirements for a proposed project including meeting the export rates targets as well as meeting the requirements through runoff volume match or the use of offsite nutrient offsets. Also added references to existing definitions in 2H rules for “project area” and runoff “volume match”

Effect: Improved clarity and added flexibility by providing multiple pathways for compliance.

.0703 of this Section. Persons who seek nutrient offset credit to these requirements shall provide proof of nutrient offset credit acquisition to the permitting authority prior to approval of the development plan; ~~the nitrogen load contributed by new development activities is held at 70 percent of the average nitrogen load contributed by the 1995 land uses of the non-urban areas of the Neuse River Basin. The local governments shall use a nitrogen export standard of 3.6 pounds/acre/year, determined by the Environmental Management Commission as 70 percent of the average collective nitrogen load for the 1995 non-urban land uses in the basin above New Bern. The EMC may periodically update the design standard based on the availability of new scientific information; Developers shall have the option of offsetting part of their nitrogen load by funding offsite management measures by making payment to the NC Ecosystem Enhancement Program or to another seller of offset credits approved by the Division or may implement other offset measures contingent upon approval by the Division. Offset payments shall meet the requirements of Rule .0240 of this Section, which establishes procedural requirements for nutrient offset payments. However, before using offset payments, the development must attain, at a minimum, a nitrogen export that does not exceed 6 pounds/acre/year for residential development and 10 pounds/acre/year for commercial or industrial development;~~

~~(ii) For the following local governments and any additional local governments identified in rule by the Commission, the post-construction requirements of 15 NCAC 02B .0277 shall supersede the requirements in this Sub-item for areas within their jurisdiction within the watershed of the Falls of the Neuse Reservoir: Durham, Raleigh, Durham County, Orange County, and Wake County; and~~

(b) Untreated nutrient loading rates from the project area shall be determined through the use of the tool most recently approved by the Division to have met the following criteria, or through an alternative method that meets the following criteria at least as well, as determined by the Division:

(i) Provides project site-scale estimates of annual precipitation-driven total nitrogen and total phosphorus load;

(ii) From all land cover types on a project site at build-out;

(iii) Based on land-cover-specific nitrogen and phosphorus loading coefficients and annual runoff volume; and

Commented [A21]: Change: Added requirement that only the most recently approved stormwater accounting tool (or Division approved equivalent) is to be used for calculating loading rates to ensure all developers and local governments are using the same accounting tool based on the most recent available data.

Effect: Provides improved consistency of rule implementation.

(iv) Is supported by the weight of evidence from available, current, and applicable research.

(c) Nutrient loading rate reductions resulting from the use of SCMs shall be determined through the use of the tool most recently approved by the Division to have met the following criteria, or an alternative method that meets the following criteria at least as well, as determined by the Division:

(i) Provides project site loading reduction estimates from the installation of DEMLR-approved SCMs;

(ii) Reductions apply to the portion of the project area's runoff volume that is directed to the SCMs;

(iii) The method partitions the runoff volume processed by the SCM among hydrologic fates and assigns nutrient concentrations to each of those fates; and

(iv) The method is supported by the weight of evidence from available, current, and applicable research.

(d) Projects shall meet the requirements set forth in 15A NCAC 02H .1003. Projects that use SCMs to treat stormwater shall use the required storm depths and meet the SCM and density requirements set forth in the stormwater programs to which they are subject pursuant to Rules .1017, .1019, and .1021. Projects not subject to any of these rules shall be considered high-density if they contain twenty four percent or greater built-upon area or have greater than two dwelling units per acre, and shall use a storm depth of one inch for SCM design.

(e) Proposed new development undertaken by a local government solely as a public road expansion or public sidewalk project or proposed new development subject to the jurisdiction of the Surface Transportation Board shall be exempt from the requirements of Sub-Item (5)(d) of this Rule and may meet the loading rate targets through use of permanent nutrient offset credit pursuant to Rule .0703 of this Section;

(f) Proposed development projects that would replace or expand existing structures and would result in a net increase in built-upon area shall be responsible for nitrogen loading from the area of disturbance less any preexisting built-upon area located therein. The developer shall have the option to either achieve the percent loading reduction goal established in Rule .0710 of this Section or meet the loading rate target of this Item;

Commented [A22]: Change: Added requirement that only the most recently approved stormwater accounting tool (or Division approved equivalent) is to be used for calculating loadreductions to ensure all developers and local governments are using the same accounting tool based on the most recent available data.

Effect: Provides improved consistency of rule implementation.

Commented [A23]: Change: Added storm depth requirements for SCMs to be consistent with requirements in 2H stormwater rules.

Effect: Ensures proper SCM design and establishes consistency across stormwater rules

Commented [A24]: Change: In response to stakeholder input added option for local government road expansion and sidewalk projects that have limited or no space for SCMs to meet export targets entirely through the use of offsite nutrient offsets.

Effect: Provides flexibility and potentially more cost-effective ways for projects meeting these criteria to meet the requirements of the rule.

Commented [A25]: Change: Updated language addressing redevelopment scenarios per new definition of development in Session Law 2014-90 to make it clear that the area of disturbance minus any preexisting BUA must be treated when development replaces or expands existing development resulting in net increase in BUA.

Effect: Reduces the area and amount of treatment required under redevelopment scenarios. Aligns rule with session law.

(g) Proposed new development projects may utilize an offsite SCM that is dedicated to treating an area encompassing the project provided the SCM complies with the applicable requirements of this Item for the area that it treats;

(h) Where pursuant to G.S. 153A-454 and G.S. 160A-459 a local government program does not review a development project proposed by a state or federal entity for the requirements of this Rule, the entity shall obtain Department review and approval; and

(i) Proposed development projects shall demonstrate compliance with the riparian buffer protection requirements of Rule .0714 of this Section or subsequent amendments or replacement to those requirements.

~~(i) (iii) there is no net increase in peak flow leaving the site from the predevelopment conditions for the 1-year, 24-hour storm.~~

~~(b) Review of new development plans for compliance with requirements for protecting and maintaining existing riparian areas as specified in 15A NCAC 02B .0233;~~

~~(c) Implementation of public education programs;~~

~~(d) Identification and removal of illegal discharges;~~

~~(e) Identification of suitable locations for potential stormwater retrofits (such as riparian areas) that could be funded by various sources; and~~

~~(f) Submittal of an annual report on October 30 in October to the Division documenting progress on and net changes to nitrogen load from the local government's planning jurisdiction.~~

(5) Local governments shall implement stormwater management programs according to their plans approved by the Commission as of March 2001.Local governments administering a stormwater management program shall submit annual reports to the Division documenting their progress and net changes to nitrogen load by October 30 of each year.

(6) If a local government fails to properly implement an approved plan, then stormwater management requirements for existing and new urban areas within its jurisdiction shall may be administered through the NPDES municipal stormwater permitting program per 15A NCAC 02H .0126:

Commented [A26]: Change: Based on stakeholder input added the option for developers to use "Regional" offsite SCMs to provide treatment for projects. This option may be particularly useful for municipalities with limited space for SCMs in downtown areas.

Effect: Provides an additional option and improved flexibility for meeting the requirements of this rule.

Commented [A27]: Change: Added language addressing enforcement of rule requirements by local governments on state and federal entities within their jurisdiction (in cases where they do not already have an NPDES permit).

Effect: Recognizes local governments have the authority to require state and federal entities to meet the requirements of their local stormwater ordinances. In cases where Local governments do not enforce these requirements the Division shall do so. Fiscal impact will be evaluated during the rulemaking process.

Commented [A28]: Change: Moved expectation to demonstrate buffer rule compliance from model program.

Effect: Clarifies requirements addressed in local government programs. No Impact.

Commented [A29]: Changed: Removed outdated peak flow requirement after consulting with NCDEMLR. Rule has been updated to include requirement in Sub-Item (5)(e) that SCMs be designed in accordance with requirements of 2H .1003 which includes the requirement that stormwater outlets to be designed so that they do not cause erosion downslope of the discharge point during peak flow from the 10-year storm event.

Effect: Updated requirement based on most recent science. Consistency between nutrient and state stormwater rules.

~~(a) Subject local governments shall develop and implement comprehensive stormwater management programs, tailored toward nitrogen reduction, for both existing and new development.~~

~~(b) These stormwater management programs shall provide all components that are required of local government stormwater programs in Sub-items (4)(a) through (f) (5)(a) through (f) of this Rule.~~

~~(c) Local governments that are subject to an NPDES permit shall be covered by the permit for at least one permitting cycle (five years) before they are eligible to submit a local stormwater management program for consideration and approval by the EMC.~~

(6) RULE IMPLEMENTATION

(a) Within 4 months of the effective date of this Rule, the Division shall submit a model local stormwater program embodying the elements in Items (4) and (5) of this Rule to the Commission for approval. The Division shall work in cooperation with subject local governments in developing this model program.

(b) Local governments designated under the original version of this Rule effective August 1998 and additional local governments designated herein shall submit a local stormwater program for approval by the Commission within 6 months and 12 months, respectively, of the Commission's approval of the model local program. These local programs shall meet or exceed the requirements in Items (4) and (5) of this Rule.

(c) The Division shall provide recommendations to the Commission regarding proposed local programs. The Commission shall approve programs or require changes based on the standards set out in Items (4) and (5) of this Rule. Should the Commission require changes, the applicable local government shall have three months to submit revisions, and the Division shall provide follow-up recommendations to the Commission within two months after receiving revisions;

(d) Within 6 months after the Commission's approval of a local program, the affected local government shall complete adoption of and implement its local stormwater program.

(e) Local governments administering a stormwater program shall submit annual reports in electronic format to the Division documenting their progress regarding each implementation requirement in Item (4) and net changes to nitrogen load by October 30th of each year. Annual reports shall also include as appendices all data utilized by nutrient calculation tools for each development stormwater plan approved in accordance with this Rule.

Commented [A30]: Change: This language was moved to Paragraph (c). Dropped the requirement for identifying stormwater retrofits based on stakeholder input.

Effect: Placement in Paragraph (c) provides better organization and clarity for local government responsibilities and elements to include in their local programs. Not change in implementation other than removing outdated and unnecessary requirement for identifying retrofit locations.

Commented [A31]: Change: Updated rule implementation timeline and added timeline for Division to develop model and new subject local governments to submit local programs.

Effect: Provides timeline for local governments who are added to this rule when they will be expected to begin implementing the requirements. Fiscal impact will be determined during the rulemaking process.

Commented [A32]: Change: Provide timelines for local governments to complete local programs allowing for more time for newly named communities.

Effect: Local governments that are already implementing will be provided 6 months to revise and submit their local programs. New subject communities will be provided more time – up to 12 months to develop and submit their programs for approval.

Commented [A33]: Change: Added New Annual Reporting Language clarifying what needs to be included in the submittal.

Effect: Provides more useful information to the Division for tracking implementation and rule compliance

(f) Any significant modifications to a local program subsequent to its approval pursuant to the requirements of this item shall be submitted to the Director for approval.

(7) COMPLIANCE. A local government's authority to approve new development stormwater plans for compliance with this Rule pursuant to Item (5) shall be contingent upon maintaining its own compliance with this Rule. A local government that fails to submit an acceptable local stormwater program within the timeframe established in this Rule, fails to implement an approved program, or fails to comply with annual reporting requirements shall be in violation of this Rule.

Commented [A34]: Change: Added stronger language to deal with noncompliance of the rule requirements.

Effect: Clarifies expectations and potential recourse for noncompliance with the rule requirements.

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-214.26; 143-215.1; 143-215.3(a)(1); S.L. 1995, c. 572; S.L. 1997-458; S.L. 2006-246;*

Eff. August 1, 1998;

Amended Eff. January 15, 2011 (this permanent rule replaces the temporary rule approved by the RRC on December 16, 2010).

Amended Eff. [New Date].

15A NCAC 02B .0236 is proposed for repeal as follows:

15A NCAC 02B .0236 NEUSE RIVER BASIN-NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: AGRICULTURAL NITROGEN LOADING REDUCTION

Commented [A35]: Change: Rule to be repealed.

Effect: Goals information moved to Agriculture Rule .0712

History Note: *Authority G.S. 143.214.1; 143.214.7; 143.215.3(a)(1).*

Eff. August 1, 1998.

Repealed Eff. [New Date]

15A NCAC 02B .0237 is proposed for repeal as follows:

15A NCAC 02B .0237 BEST MANAGEMENT PRACTICE COST-EFFECTIVENESS RATE

History Note: *Authority G.S. 143-214.1;*

Eff. April 1, 1997.

Repealed Eff. [New Date]

Commented [A36]: Change: Rule to be repealed.

Effect: The BMP cost-effectiveness rate will be determined based on option selected and requirements of Rule .0703

15A NCAC 02B .0238 is proposed for amendment as follows:

15A NCAC 02B ~~.0238~~.0712NEUSE RIVER ~~BASIN NUTRIENT SENSITIVE WATERS MANAGEMENT~~ ~~BASIN~~ NUTRIENT STRATEGY: ~~AGRICULTURAL NITROGEN REDUCTION STRATEGY~~ AGRICULTURE

~~The following requirements apply to all persons in the Neuse River Basin who engage in agricultural operations. Agricultural operations are activities which relate to the production of crops, livestock, and poultry.~~ This Rule sets forth a process by which agricultural operations in the Neuse River Basin will collectively limit their nitrogen loading to the Neuse estuary, as prefaced in Rule .0710 of this Section. Nothing in this rule preempts the requirements of 15A NCAC 02B .0280 for agricultural operations subject to the Falls Reservoir Nutrient Strategy.

(1) All persons engaging in agricultural operations in the Neuse River Basin shall collectively achieve and maintain a 30 percent net total nitrogen loading reduction from the cumulative average 1991-1995 nitrogen loadings within five years from the effective date of this Rule. Persons subject to this Rule are provided with two options for meeting the requirements of this Rule. The first option is to sign-up for and participate in implementing a collective local strategy for agricultural nitrogen reduction as described in Item (7) of this Rule. This option allows site-specific plans to be developed for those operations where further nitrogen reduction practices are necessary to achieve the collective reduction goal. The second option requires the implementation of standard Best Management Practices as specified in Item (8) of this Rule. Failure to meet requirements of this Rule may result in imposition of enforcement measures as authorized by G.S. 143-215.6A (civil penalties), G.S. 143-215.6B (criminal penalties), and G.S. 143-215.6C (injunctive relief). PURPOSE. The purpose of this Rule is to maintain or exceed the percentage reduction goal defined in Rule .0710 of this Section on the collective loss of nitrogen from all lands used for agricultural production as described in Item (2) of this Rule from its 1991-1995 baseline level, as estimated by best available accounting practices.

(a) PROCESS. This Rule requires farmers in the Basin to implement land management practices that collectively, on a county or watershed basis, will achieve the nutrient goals.

(b) LIMITATION. This Rule may not fully address the agricultural nitrogen reduction goal of the Neuse Nutrient Sensitive Waters Strategy in that it does not address atmospheric sources of nitrogen to the Basin, including atmospheric emissions of ammonia from sources located both within and outside of the Basin. As better information becomes available from ongoing research on atmospheric nitrogen loading to the Basin from

Commented [A37]: ~~**Change:** Revised to capture substance of proposed repealed rule 02B .0236, which set the reduction goal for agriculture.~~

~~**Effect:** Streamlined content. No substantive change.~~

these sources, and on measures to control this loading, the Commission may undertake separate rule-making to require such measures it deems necessary from these sources to support the goals of the Neuse Nutrient Sensitive Waters Strategy.

(2) APPLICABILITY. This Rule shall apply to all persons engaging in agricultural operations, including those related to crops, horticulture, livestock, and poultry, in the geographic area subject to the Neuse nutrient strategy as described in Rule .0710 of this Section. This Rule applies to livestock and poultry operations above the size thresholds in this Item in addition to requirements for animal operations set forth in general permits issued pursuant to G.S. 143-215.10C. Nothing in this Rule shall be deemed to allow the violation of any assigned surface water, groundwater, or air quality standard by any agricultural operation, including any livestock or poultry operation below the size thresholds in this Item. For the purposes of this Rule, agricultural operations are activities that relate to any of the following pursuits:

~~(a) The commercial production of crops or horticultural products other than trees. As used in this Rule, commercial shall mean activities conducted primarily for financial profit.~~

~~(b) Research activities in support of such commercial production.~~

~~(c) The production or management of any of the following number of livestock or poultry at any time, excluding nursing young:~~

(i) 5 or more horses;

(ii) 20 or more cattle;

(iii) 20 or more swine not kept in a feedlot, or 150 or more swine kept in a feedlot;

(iv) 120 or more sheep;

(v) 130 or more goats;

(vi) 650 or more turkeys;

(vii) 3,500 or more chickens; or

(viii) Any single species of any other livestock or poultry, or any combination of species of livestock or poultry that exceeds 20,000 pounds of live weight at any time.

(3) IMPLEMENTATION PROCESS. A Basin Oversight Committee and county-level Local Advisory Committees shall coordinate activities and account for progress. The membership, roles and

Commented [A38]: ~~**Change:** Updated to reflect current implementation status and to eliminate individual option of standard BMPs vs. collective compliance.~~

~~**Effect:** No practical impact.~~

Commented [A39]: ~~**Change:** Added specificity to applicability description and size thresholds for livestock to conform with Tar-Pamlico ag rule.~~

~~**Effect:** Reduces uncertainty, narrows scope of applicability~~

responsibilities of these committees are set forth in Items (4) and (6) of this Rule. Accounting for nitrogen load-reducing actions on agricultural lands within the basin shall follow requirements set forth in Item (5) of this Rule. Producers may be eligible to obtain cost share and technical assistance from the NC Agriculture Cost Share Program and similar federal programs to contribute to their counties' ongoing nitrogen reductions. Committee activity shall be guided by the following:

~~(a) OPTIONS FOR INDIVIDUAL OPERATIONS. Persons subject to this Rule may elect to implement practices meeting the standards identified in Item (7) of this Rule that contribute to maintenance of collective local compliance with the goal identified in Item (1) of this Rule, but are not required to implement any specific practices provided their basin collectively maintains compliance with the goal.~~

~~(b) MAINTENANCE OF GOAL. Accounting shall annually demonstrate maintenance or exceedence of the nitrogen reduction goal on a basin basis. Where three sequential annual reports show that the Basin did not meet its nitrogen reduction goal, the Basin Oversight Committee shall work with the Division of Soil and Water Conservation and Local Advisory Committees to seek reduction actions by operations to bring agriculture collectively back into compliance, and shall report on their efforts in subsequent annual reports. Should subsequent annual reports not reverse the trend of noncompliance, the Commission may seek a more specific implementation plan from the Basin Oversight Committee, which may include an assessment of need for specific action by the Commission.~~

(2) (4) BASIN OVERSIGHT COMMITTEE. The Basin Oversight Committee shall have the following membership, role and responsibilities: Formation and membership of the Basin Oversight Committee. The Environmental Management Commission shall delegate to the Secretary of the Department of Environment and Natural Resources the responsibility of forming a Basin Oversight Committee.

(a) The Secretary shall solicit one nomination for membership on this Committee from each of the following agencies: ~~(a) MEMBERSHIP. The Director of the Division of Water Resources shall be responsible for maintaining the following membership composition. Until such time as the Commission determines that long-term compliance with this rule is assured, the Director shall solicit one nomination for membership on this Committee from each agency in Sub-Items (4)(a)(i) through (4)(a)(v). The Director may appoint a replacement at any time for an interest in Sub-Items (4)(a)(vi) through (4)(a)(viii) of this Rule upon request of representatives of that interest or by the request of the Commissioner of Agriculture:~~

Commented [A40]: ~~**Change:** Part of content reorganization/streamlining consistent with other ag rules.~~

~~**Effect:** Clarity, brevity. No substantive change~~

Commented [A41]: ~~**Change:** Added language clarifying individual's ability to meet requirements through the collective compliance approach.~~

~~**Effect:** Improved clarity. No Impact.~~

Commented [A42]: ~~**Change:** Adds express ability for EMC to seek corrective action.~~

~~**Effect:** Probably no practical difference.~~

(i) Division of Soil and Water Conservation,

(ii) United States Department of Agriculture- Natural Resources Conservation ~~Service,~~ Service (shall serve in an "ex-officio" non-voting capacity and shall function as a technical program advisor to the Committee),

(iii) North Carolina Department of ~~Agriculture,~~ Agriculture and Consumer Services,

(iv) North Carolina Cooperative Extension Service, ~~and~~

(v) Division of Water ~~Quality.~~ Resources,

(vi) Up to two environmental interests,

(vii) Up to two general farming interest, and

(viii) Scientific community with experience related to water quality problems in the Neuse River Basin.

(b) The Secretary shall also solicit one nomination that represents environmental interests, one nomination that represents agricultural interests, and one from the scientific community with experience related to water quality problems in the Neuse River Basin.

(c) The Secretary, Department of Environment and Natural Resources, shall appoint members of the Basin Oversight Committee from the nominees provided in Sub-Items (2)(a) and (2)(b) of this Rule. Members shall be appointed for a term not to exceed five years and shall serve at the pleasure of the Secretary. The United States Department of Agriculture-Natural Resources Conservation Service member shall serve in an "ex-officio" non-voting capacity and shall function as a technical program advisor to the Committee.

(3) Role of the Basin Oversight Committee. The Environmental Management Commission shall delegate the following responsibilities to the Basin Oversight Committee.

(a) Develop a tracking and accounting methodology, as described below, for evaluating total nitrogen loading from agricultural operations and progress toward reaching the total nitrogen net loading reduction from the implementation BMPs within the Neuse River Basin. The accountability methodology must demonstrate how the nitrogen loading reduction can be met collectively by implementing best management practices approved by the Soil and Water Conservation Commission that include, but are not limited to, water control structures, riparian area establishment, and nutrient management.

(b) Submit a draft accountability process in accordance with the requirements in Sub-Items (3)(a) and (3)(c) of this Rule to the Environmental Management Commission for review within six months after the effective date of the rule and the final accountability process to the Environmental Management Commission for approval within one year after the effective date of the rule. The Environmental Management Commission shall approve the accountability process if it meets requirements in Sub-Items (3)(a) and (3)(c) of this Rule. If the Basin Oversight Committee fails to submit an approvable accountability process to the Environmental Management Commission, then the Environmental Management Commission may accept alternative accountability process proposals within 15 months of the effective date of this Rule. If the Environmental Management Commission fails to receive an approvable accountability process, then the Environmental Management Commission may require all agricultural operations to follow the standard Best Management Practices option as specified in Item (8) of this Rule.

(c) Include in the accountability process a method to accurately track implementation of BMPs, including location and type of BMPs; to estimate nitrogen reductions from BMP implementation; to quantify increases or decreases in nitrogen loading due to changes in land use, modified agricultural activity, or atmospheric nitrogen loading, based on the best available scientific information; to ensure operation and maintenance of BMPs, including year round management for water control structures; to address life expectancy of BMPs; and a method to ensure maintenance of the nitrogen net loading reduction after the initial five years of this Rule, including substitute BMPs to replace expired practices and additional BMPs to offset new sources of nitrogen.

(d) Calculate a separate total nitrogen loading for agricultural lands in the Neuse River Basin above and below New Bern based on the average of 1991-1995 conditions. Based on this loading, calculate a separate 30 percent net reduction. Loading calculations must include atmospheric emissions and deposition of nitrogen from agricultural lands based on the best available scientific information. Allocate to counties or watersheds, as allowed in Sub-Item (4)(a) of this Rule, within the Neuse River Basin their portion of the calculated nitrogen loading reduction from agricultural operations, including any division of the reduction between specific categories of agricultural operations. Each county or watershed may not have to reduce individually its nitrogen loading by 30 percent; however, the nitrogen loading reduction from all counties or watershed above New Bern shall collectively meet their total nitrogen reduction and all counties or watersheds below New Bern shall collectively meet their total nitrogen reduction. If the Basin Oversight Committee fails to allocate the nitrogen loading reductions from agricultural operations to

counties or watersheds within the Neuse River Basin, the Environmental Management Commission may assign the agricultural nitrogen reductions based on the approved accountability process as described in Sub-Items (3)(a) and (3)(c) of this Rule.

(e) Review, approve and summarize county nitrogen reduction strategies and present these strategies to the Environmental Management Commission for approval within two years from the effective date of this Rule.

(f) Review, approve and summarize local nitrogen reduction annual reports and present these reports to the Environmental Management Commission each October. Information to be included in the Annual Report is described in Item (5)(d) of this Rule.

~~(b) ROLE. The Basin Oversight Committee shall:~~

~~(i) Continue to review, approve and summarize local nitrogen loss annual reports to ensure ongoing implementation of the accounting method approved by the Commission under the original version of this Rule effective August 1998, as conforming to the requirements of Item (5) of this Rule. Continue to submit these reports as initiated in 2002, to the Director annually;~~

~~(ii) Take actions called for under Sub-Item (3)(b) as needed to address maintenance of the nitrogen reduction goal; and~~

~~(iii) Identify and implement refinements to the accounting method as needed to reflect advances in scientific understanding, including establishment or refinement of nutrient reduction efficiencies for BMPs.~~

(5) ACCOUNTING METHODOLOGY. Success in meeting this Rule's purpose will be gauged by estimating percentage changes in nitrogen loss from agricultural lands in the Neuse Basin. The Basin Oversight Committee shall develop maintain, and update as indicated elsewhere in this Item, accounting methods that meet the following requirements:

(a) The nitrogen method shall estimate baseline and annual total nitrogen losses from agricultural operations in each county and for the entire Neuse Basin. Baseline losses and relative loss reduction progress shall be adjusted as frequently as can be supported by available data to account for lands permanently removed from agricultural control through development;

Commented [A43]: ~~**Change:** Added an additional environmental representative and farming interest to the Committee Membership. Provided process for appointing members to fill empty seats.~~

~~**Effect:** Provides consistency of interests represented on oversight committees across watersheds. Improved clarity on process for appointing new members. No Impact on rule implementation.~~

Commented [A44]: ~~**Change:** Reorganized and updated role and responsibilities of the Basin Oversight Committee recognizing several of the responsibilities previously listed in rule have already been addressed during the earlier years of rule implementation.~~

~~**Effect:** Brings responsibilities up to date. Provides Consistency across watersheds. No impact on rule implementation.~~

Commented [A45]: ~~**Change:** Updated the language addressing accounting methodologies recognizing the Basin Oversight Committee has developed tools currently used for tracking progress with the required reduction goals.~~

~~**Effect:** Improved clarity and brings the rule language up to date reflecting how the rule requirements are being implemented.~~

Commented [A46]: ~~**Change:** Added language calling for evaluation and adjustment of baseline losses and relative loss reduction progress based on data availability to address agricultural land lost to development.~~

~~**Effect:** Agriculture's reduction progress will be measured against an updated baseline that reflects the nutrient contributions from lands still within the Agriculture universe. Fiscal impact will be evaluated during rulemaking process.~~

(b) The nitrogen method shall include a means of tracking implementation of BMPs, including number, type, and area affected;

(c) The nitrogen method shall include a means of estimating incremental nitrogen loss reductions from implementation of BMPs that conform to requirements of Item (7) of this Rule and of evaluating progress toward and maintenance of the nutrient goal from changes in BMP implementation, fertilization, and changes in individual crop acres; and

(d) The nitrogen method shall be refined as research and technical advances allow.

~~(4)~~ (6) ~~Formation and membership of the Local Advisory Committees.~~ LOCAL ADVISORY COMMITTEES. The ~~Environmental Management Commission shall delegate to the~~ Directors of the Division of Water ~~Quality~~ Resources and Division of Soil and Water Conservation ~~the responsibility of forming~~ shall maintain Local Advisory ~~Committees.~~ Committees initially established in February and March, 1999, as follows:

~~(a) The Directors shall form Local Advisory Committees in MEMBERSHIP. For each county (or or watershed specified by the Basin Oversight Committee) Committee within the Neuse River Basin.~~ The ~~Basin, the Directors shall~~ solicit nominations for ~~jointly maintain membership on the Local Advisory Committee from each of the following local~~ agencies: ~~entities, whose appointees shall serve at the pleasure of the Directors:~~

(i) Soil and Water Conservation District,

(ii) United States Department of Agriculture- Natural Resources Conservation Service,

(iii) North Carolina Department of Agriculture,

(iv) North Carolina Cooperative Extension Service,

(v) North Carolina Division of Soil and Water Conservation, and

(vi) ~~The Directors shall also solicit at least two nominations that represents a local farmer in the county watershed.~~ At least two farmers that reside in the county.

The Soil and Water Conservation District may be designated by the Basin Oversight Committee as the lead agency on the Local Advisory Committee.

~~(b) ROLE. Local Advisory Committees shall:~~

Commented [A47]: ~~**Change:** Technical corrections updating Session Law References and Agency names.~~

~~**Effect:** No Impact. Improved Clarity~~

~~(i) Continue to submit annual reports to the Basin Oversight Committee estimating total crop production on agricultural operations for the preceding calendar year, summarizing land use changes in the county and making recommendations to the Basin Oversight Committee on the need for updates to the accounting methodology. Reports shall include documentation on the BMPs implemented, including type and location, that satisfy the requirements identified in item (6) of this Rule and documentation of any expired contracts for BMPs; and~~

~~(ii) Take actions called for under Sub-Item (3)(b) to address maintenance of the nitrogen reduction goal.~~

~~(7) PRACTICE STANDARDS. To receive nutrient reduction credit under the accounting methods described elsewhere in this Rule, a BMP shall be included in the accounting method approved by the Commission under the original version of this Rule effective August 1998, or in a subsequent revision to that method identified in annual reporting, and it shall be implemented according to the applicable nutrient-related standards identified by the BOC and established by the NC Soil and Water Conservation Commission or the USDA-Natural Resources Conservation Service in North Carolina.~~

(b) The Environmental Management Commission and Soil and Water Conservation Commission shall appoint members of Local Advisory Committee from the nominees provided in Sub-Item (4)(a) of this Rule and shall be appointed for a term not to exceed five years and shall serve at the pleasure of the Commissions.

(5) Role of the Local Advisory Committees. The Environmental Management Commission shall delegate the following responsibilities to employees of the Department who are members of the Local Advisory Committees and employees of the Division of Soil and Water Conservation or its designee. These employees shall act with advice from the Local Advisory Committees.

(a) Conduct a sign-up process for persons wishing to voluntarily implement the local nitrogen reduction strategy as specified in Item (7) of this Rule. This sign-up process shall be completed within one year following the effective date of this Rule.

(b) Develop local nitrogen reduction strategies that meet the nitrogen loading reduction goal for agricultural operations assigned by the Basin Oversight Committee. The local strategies shall be designed to achieve the required nitrogen loading reduction within five years from the effective date of this Rule. A matrix of best management practice options, which account for stream order,

Commented [A48]: ~~**Change:** Updates role of the local advisory committees LACs.~~

~~**Effect:** No Impact. Brings rule language up to date and better reflects how requirements are currently being implemented.~~

Commented [A49]: ~~**Change:** Adds practice standards requirements for BMPs and reference agencies that provide standards for Agricultural BMPs.~~

~~**Effect:** Ensures proper BMP implementation and use of approved accounting methods to earn nutrient reduction credit.~~

Commented [A50]: ~~**Change:** Local advisory Committee roles and responsibility language has been updated and reorganized in new Item (6).~~

~~**Effect:** No practical impact. Brings rule text up to date.~~

floodplain width, and regional variations in soil types and topography, may be used in developing the local nitrogen reduction strategies. Local nitrogen reduction strategies must specify the name and location of participant agricultural farming operations, BMPs which will be required as part of the plan, estimated nitrogen reduction, schedule for BMP implementation, and operation and maintenance requirements. If the Local Advisory Committee fails to develop the local nitrogen reduction strategy, the Environmental Management Commission may develop the strategy based on the tracking and accounting method approved by the Environmental Management Commission.

(c) Submit an annual report to the Basin Oversight Committee each May on net total nitrogen loading reductions from agricultural operations, the implementation of BMPs for nitrogen control, and progress towards the total nitrogen loading reduction requirements in the Neuse River Basin above and below New Bern.

(d) Include in the annual report, at a minimum, documentation on the BMPs implemented (including type and location), their costs, documentation of any expired contracts for BMPs, estimated nitrogen net loading reductions achieved as a result of those BMPs, any increases or decreases in nitrogen loading resulting from changes in land use or modified agricultural-related activity, discussion of operation and maintenance of BMPs, and a summary of the estimated load from agricultural operations for the previous year, and any modifications to the accounting methodology. Information shall be provided in the annual report on the status of BMP implementation and estimated total nitrogen reduction by all agricultural operations within the Neuse River Basin in each county or watershed. The annual report shall also be summarized separately for cropland, livestock and poultry activities.

(6) Options for meeting the collective total nitrogen net loading reduction requirement. Each agricultural operation in the Neuse River Basin shall have two options for meeting the requirements of this Rule. The options are to either implement a local nitrogen reduction strategy, specified by Item (7) of this Rule, or implement standard Best Management Practices specified by Item (8) of this Rule.

(7) Local nitrogen reduction strategy option. All persons subject to this Rule that choose to implement the county nitrogen reduction plan must complete the sign-up process that will be conducted per the requirements of Item (5)(a) of this Rule. This sign-up process will be completed within one year from the effective date of this Rule. If a person subject to this Rule does not complete the sign-up process, he shall be subject to implementation of Best Management Practices as specified in Item (8) of this Rule. Persons who choose to participate in the local nitrogen reduction strategy must commit and implement their portion of the plan within five years of the effective date of this Rule. A person may withdraw from the local

nutrient reduction strategy up until the time that the local strategy is finalized by the Local Advisory Committee and the person signs the specific plan for his property, which represents his commitment to implement the plan within five years of the effective date of the rules. After a person has made the commitment to implement the local strategy by signing the plan for his property, then such persons may not withdraw from the local nitrogen reduction strategy during the initial five-year period. The local nitrogen reduction strategy is not required to be more stringent than the standard best management practice option provided that the net nitrogen reduction goals are met collectively; however, the Local Advisory Committees may develop strategies that achieve reductions of greater than 30 percent.

(8) Standard best management practice option. If a person subject to this Rule does not complete the sign-up process for implementation of the local nitrogen reduction strategy, then he shall implement the following best management practices within four years following the effective date of this Rule.

Commented [A51]: ~~**Change:** Removed outdated individual standard BMP option to reflect current implementation status of collective compliance.~~

~~**Effect:** No practical impact.~~

(a) A forested riparian area, as described in Sub-Item (8)(a)(i)-(ii) of this Rule, is required on all sides of surface waters in the Neuse River Basin (intermittent streams, perennial streams, lakes, ponds and estuaries) as indicated on the most recent versions of U.S.G.S. 1:24,000 scale (7.5 minute quadrangle) topographic maps or other site-specific evidence. Design and installation of the forested riparian area shall be such that, to the maximum extent possible, sheet flow of surface water is achieved. Any activities that would result in water quality standard violations or disrupt the structural or functional integrity of the forested riparian area are prohibited. The protected riparian area shall have two zones as follows:

~~(i) Zone 1 shall be undisturbed forest. Zone 1 begins at the top of bank for intermittent streams and perennial streams without tributaries and extends landward a distance of 30 feet on each side of the waterbody, measured horizontally on a line perpendicular to the waterbody. For all other waterbodies, Zone 1 begins at the top of bank or the mean high water line and extends landward a distance of 30 feet, measured horizontally on a line perpendicular to the waterbody. Forest vegetation of any width that exists in Zone 1 as of July 22, 1997 must be preserved and maintained in accordance with Sub-Items (8)(a)(i)(A)-(E) of this Rule. The application of fertilizer in Zone 1 is prohibited. The following practices and activities are allowed in Zone 1:~~

(A) Natural regeneration of forest vegetation and planting vegetation to enhance the riparian area if disturbance is minimized, provided that any plantings shall primarily consist of locally native trees and shrubs;

(B) Selective cutting of individual trees of high value in the outer 20 feet of Zone 1, provided that the basal area of this outer 20-foot wide area remains at or above 75 square feet per acre and is computed according to the following method. Basal area of this outer 20-foot wide area shall be computed every 100 feet along the stream to ensure even distribution of forest vegetation and shall be based on all trees measured at 4.5 feet from ground level. No tracked or wheeled equipment is allowed in Zone 1 except at stream crossings which are designed, constructed and maintained in accordance with Forest Practice Guidelines Related to Water Quality (15A NCAC 1J .0201 – .0209);

(C) Horticulture or silvicultural practices to maintain the health of individual trees;

(D) Removal of individual trees which are in danger of causing damage to dwellings, other structures, or the stream channel; and

(E) Removal of dead trees and other timber cutting techniques necessary to prevent extensive pest or disease infestation if recommended by the Director, Division of Forest Resources and approved by the Director, Division of Water Quality.

(ii) Zone 2: begins at the outer edge of Zone 1 and extends landward a minimum of 20 feet as measured horizontally on a line perpendicular to the waterbody. The combined minimum width of Zones 1 and 2 shall be 50 feet on all sides of the waterbody. Vegetation in Zone 2 shall consist of a dense ground cover composed of herbaceous or woody species which provides for diffusion and infiltration of runoff and filtering of pollutants. The following practices and activities are allowed in Zone 2 in addition to those allowed in Zone 1: Periodic mowing and removal of plant products such as timber, nuts, and fruit is allowed on a periodic basis provided the intended purpose of the riparian area is not compromised by harvesting, disturbance, or loss of forest or herbaceous ground cover. Forest vegetation in Zone 2 may be managed to minimize shading on adjacent land outside the riparian area if the water quality function of the riparian area is not compromised.

~~(iii) The following practices and activities are not allowed in Zone 1 and Zone 2:~~

~~(A) Land disturbing activities and placement of fill and other materials, other than those allowed in Items (8)(a)(i) and (8)(b) of this Rule;~~

~~(B) New development;~~

~~(C) New on-site sanitary sewage systems which use ground absorptions;~~

~~(D) Any activity that threatens the health and function of the vegetation including, but not limited to, application of fertilizer or chemicals in amounts exceeding the manufacturer's recommended rate, uncontrolled sediment sources on adjacent lands, and the creation of any areas with bare soil.~~

~~(iv) Timber removal and skidding of trees in the riparian area shall be directed away from the water course or water body. Skidding shall be done in a manner to prevent creation of ephemeral channels perpendicular to the water body. Any tree removal must be performed in a manner that does not compromise the intended purpose of the riparian area and is in accordance with the Forest Practices Guidelines Related to Water Quality (15A NCAC 1J .0201 - .0209).~~

(b) The following waterbodies and land uses are exempt from the riparian area requirement:

~~(i) Ditches and manmade conveyances, other than modified natural streams, which under normal conditions do not receive drainage waters from any tributary ditches, canals, or streams, unless the ditch or manmade conveyance delivers runoff directly to waters classified in accordance with 15A NCAC 2B .0100;~~

~~(ii) Ditches and manmade conveyances other than modified natural streams which are used exclusively for drainage of silvicultural land or naturally forested areas. All forest harvesting operations shall be in compliance with North Carolina's Forest Practices Guidelines Related to Water Quality;~~

~~(iii) Areas mapped as perennial streams, intermittent streams, lakes, ponds or estuaries on the most recent versions of United States Geological Survey 1:24,000 scale (7.5 minute quadrangle) topographic maps where no perennial, intermittent waterbody, or lakes, ponds or estuaries exists on the ground;~~

(iv) Ponds and lakes created for animal watering, irrigation, or other agricultural uses that are not part of a natural drainage way that is classified in accordance with 15A NCAC 2B .0100;

(v) Water dependent structures as defined in 15A NCAC 2B .0202 provided that they are located, designed, constructed and maintained to provide maximum nutrient removal, to have the least adverse effects on aquatic life habitat and to protect water quality;

(vi) The following uses may be allowed where no practical alternative exists. A lack of practical alternatives may be shown by demonstrating that, considering the potential for a reduction in size, configuration or density of the proposed activity and all alternative designs, the basic project purpose cannot be practically accomplished in a manner which would avoid or result in less adverse impact to surface waters. Also, these structures shall be located, designed, constructed, and maintained to have minimal disturbance, to provide maximum nutrient removal and erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical through the use of best management practices:

(A) Road crossings, railroad crossings, bridges, airport facilities, and utility crossings may be allowed if conditions specified in Sub-Item (8)(b)(vi) of this Rule are met;

(B) Stormwater management facilities and ponds, and utility construction and maintenance corridors for utilities such as water, sewer or gas, may be allowed in Zone 2 of the riparian area as long as the conditions specified in Sub-Item (8)(b)(vi) of this Rule are met and they are located at least 30 feet from the top of bank or mean high water line. Additional requirements for utility construction and maintenance corridors are listed in Sub-Item (8)(b)(vi) of this Rule.

(vii) A corridor for the construction and maintenance of utility lines, such as water, sewer or gas, (including access roads and stockpiling of materials) may run parallel to the stream and may be located within Zone 2 of the riparian area, as long as no practical alternative exists and they are located at least 30 feet from the top of bank or mean high water line and best management practices are installed to minimize runoff and maximize water quality protection to the maximum extent practicable. Permanent, maintained access corridors shall be

restricted to the minimum width practicable and shall not exceed 10 feet in width except at manhole locations. A 10 feet by 10 feet perpendicular vehicle turnaround is allowed provided they are spaced at least 500 feet apart along the riparian area;

(viii) Stream restoration projects, scientific studies, stream gauging, water wells, passive recreation facilities such as boardwalks, trails, pathways, historic preservation and archaeological activities are allowed; provided that they are located in Zone 2 and are at least 30 feet from the top of bank or mean high water line and are designed, constructed and maintained to provide the maximum nutrient removal and erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to maximum extent practical through the use of best management practices. Activities that must cross the stream or be located within Zone 1 are allowed as long as all other requirements of this Item are met;

(ix) Stream crossings associated with timber harvesting are allowed if performed in accordance with the Forest Practices Guidelines Related to Water Quality (15A NCAC 1J.0201-.0209); and

(x) In addition to exceptions included in Sub-Item (8)(b)(i) (ix), canals, ditches, and other drainage conveyances are exempt from the riparian area requirement if both water control structures with a water control structure management plan and a nutrient management plan, are implemented on the adjacent agricultural land according to the standards and specifications of the USDA - Natural Resources Conservation Service or the standards and specifications adopted by the NC Soil and Water Conservation Commission. The water control structures and nutrient management practices must provide equivalent protection and directly affect the land and waterbodies draining into the waterbody exempted from the riparian area requirement. To the maximum extent practical, water control structures shall be managed to maximize nitrogen removal throughout the year. A technical specialist designated pursuant to rules adopted by the Soil and Water Conservation Commission must provide written approval that the nutrient management and water management plans meet the standards and specifications of the USDA - Natural Resources Conservation Service or the standards and specifications adopted by the NC Soil and Water Conservation

~~Commission. If the nutrient management plans and water management plans are not implemented, then a riparian area pursuant to this Section is required.~~

(c) The following are modifications to the riparian area requirements.

~~(i) On agricultural land where either water control structures with a water control structure management plan, or a nutrient management plan is implemented according to the standards and specifications of the USDA - Natural Resources Conservation Service or the standards and specifications adopted by the NC Soil and Water Conservation Commission, then a 20-ft forested or a 30-ft vegetated buffer is required. The water control structures or nutrient management practices must provide equivalent protection and directly affect the land and waterbodies draining into the waterbody with a modified buffer requirement. To the maximum extent practical, water control structures shall be managed to maximize nitrogen removal throughout the year. A technical specialist designated pursuant to rules adopted by the Soil and Water Conservation Commission must provide written approval that the nutrient management plan meets the standards and specifications of the USDA - Natural Resources Conservation Service or the standards and specifications adopted by the NC Soil and Water Conservation Commission.~~

~~(ii) A vegetated riparian area may be substituted for an equivalent width of forested riparian area within 100 feet of tile drainage.~~

~~(iii) Where the riparian area requirements would result in an unavoidable loss of tobacco allotments [(7 CFR 723.220(c)] and the BMPs of controlled drainage or nutrient management are not in place, forest cover is required only in the first 20 feet of the riparian area.~~

(d) Maintenance of Zones 1 and 2 is required in accordance with this Rule.

~~(i) Sheet flow must be maintained to the maximum extent practical through dispersing concentrated flow and re-establishment of vegetation to maintain the effectiveness of the riparian area.~~

~~(ii) Concentrated runoff from new ditches or manmade conveyances must be dispersed into sheetflow before the runoff enters Zone 2 of the riparian area. Existing ditches and manmade conveyances, as specified in Sub-Item (8)(b)(ii)~~

~~of this Rule, are exempt from this requirement; however, care shall be taken to minimize pollutant loading through these existing ditches and manmade conveyances from fertilizer application or erosion.~~

~~(iii) Periodic corrective action to restore sheet flow shall be taken by the landowner if necessary to impede the formation of erosion gullies which allow concentrated flow to bypass treatment in the riparian area.~~

(e) Periodic maintenance of modified natural streams such as canals is allowed provided that disturbance is minimized and the structure and function of the riparian area is not compromised. A grassed travelway is allowed on one side of the waterbody when alternative forms of maintenance access are not practical. The width and specifications of the travelway shall be only that needed for equipment access and operation. The travelway shall be located to maximize stream shading.

(f) Where the standards and management requirements for riparian areas are in conflict with other laws, regulations, and permits regarding streams, steep slopes, erodible soils, wetlands, floodplains, forest harvesting, surface mining, land disturbance activities, development in Coastal Area Management Act Areas of Environmental Concern, or other environmental protection areas, the more protective shall apply.

(g) The Environmental Management Commission acknowledges that best management practices under the standard management practice option of this Rule do not fully address nitrogen loading, including atmospheric emissions and deposition, from animal operations. As information becomes available on nitrogen loadings from animal operations and best management practices to control these loadings, other best management practices from animal operations may be required by the Commission as necessary to achieve equivalent reduction in nitrogen loadings therefrom. These additional best management practices shall be required if deemed necessary to achieve a net total nitrogen loading reduction from the animal operations based on average 1991-1995 conditions.

Commented [A52]: ~~**Change:** Removed unnecessary language for unused standard BMP option since producers in the watershed have chosen to comply with the rule requirements using the collective compliance approach.~~

~~**Effect:** No Impact~~

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.3(a)(1); S.L. 1997-458;*

Eff. August 1, 1998.

Amended Eff. [New Date].

15A NCAC 02B .0239 IS PROPOSED FOR REPEAL AS FOLLOWS:

15A NCAC 02B .0239 NEUSE RIVER BASIN: NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: NUTRIENT MANAGEMENT

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.3(a)(1);*

Eff. August 1, 1998.

Repealed Eff. [New Date]

Commented [A53]: Change: Rule to be repealed.

Effect: Removed both an unenforceable requirement (all fertilization according to approved plans) and already completed requirement (Extension training).

15A NCAC 02B .0240 is proposed for amendment as follows:

15A NCAC 02B ~~.0240~~ .0703 NUTRIENT OFFSET ~~PAYMENTS~~ CREDIT TRADING

~~(a) The purpose of this Rule is to establish procedures for the optional payment of nutrient offset fees to the NC Ecosystem Enhancement Program, subsequently referred to as the Program, or to other public or private parties where the Program or such parties implement projects for nutrient offset purposes and accept payments for those purposes, and where either of the following applies:~~

~~(1) The following rules of this Section allow offsite options or nutrient offset payments toward fulfillment or maintenance of nutrient reduction requirements:~~

(A) .0234 and .0235 of the Neuse nutrient strategy,

(B) .0258 of the Tar-Pamlico nutrient strategy, and

(C) applicable rules of the Jordan nutrient strategy, which is described in Rule .0262; and

~~(2) Other rules adopted by the Commission allow this option toward fulfillment of nutrient load reduction requirements.~~

~~(a) PURPOSE. The purpose of this Rule is to establish standards and procedures applicable to providers for approval of nutrient reduction projects and associated nutrient offset credits that will be transferred to persons or entities subject to nutrient rules of this Subchapter. Nutrient offset credits represent a compliance option where allowed by nutrient rules of this Subchapter. Nutrient offset credit is distinct from nutrient accounting for direct compliance with individual nutrient strategy rules, which is not governed by this rule. Nutrient accounting includes joint compliance by multiple local governments as authorized in individual nutrient strategy rules.~~

~~(b) Offset fees paid pursuant to this Rule shall be used to achieve nutrient load reductions subject to the following geographic restrictions:~~

~~(1) Load reductions shall be located within the same 8-digit cataloguing unit, as designated by the US Geological Survey, as the loading activity that is being offset;~~

~~(2) The Division shall track impacts by 10-digit watershed, as designated by the US Geological Survey and providers shall locate projects proportional to the location of impacts to the extent that the projects would meet the least cost alternative criterion per S.L. 2007-438. The location of load reduction projects shall be reviewed during the approval process described in Paragraph (c) of this Rule;~~

~~(3) Impacts that occur in the watershed of Falls Lake in the upper Neuse River Basin may be offset only by load reductions in the same watershed; Impacts in the Neuse 01 8-digit cataloguing unit~~

Commented [A54]: Individual nutrient strategy rules authorize nutrient offset credit purchases, so not necessary in this rule.

Commented [A55]: Clarification regarding the scope and intent of the rule.

Commented [A56]: NRCA May 2018 change. Material change in effect from May 2018 staff version of this rule. Omission of "or utilized by" omits application of the rule to regulated entities that seek to use self-generated offset credits for regulatory purposes.

Commented [A57]: NRCA May 2018 change. No change in effect from May 2018 staff version of this rule. Language in the prior rule version sought to clarify that in a joint compliance arrangement, local governments can utilize offset credits within their nutrient reduction portfolio. However, offset credits are not required for group compliance.

Commented [A58]: Geographic restrictions rephrased for clarity. No change in effect.

~~below the Falls watershed, as designated by the US Geological Survey, may be offset only by load reductions in that same lower watershed;~~

~~(4) Restrictions established in the Jordan nutrient strategy, which is described in Rule 15A NCAC 02B .0262; and~~

~~(5) Any further restrictions established by the Commission through rulemaking.~~

~~(b) GEOGRAPHIC RESTRICTIONS. Nutrient offset credits may be used to satisfy regulatory obligations only when generated by a nutrient reduction project within an allowable geographic area identified in G.S. 143-214.26, as designated by the U.S. Geological Survey, with the following additional restrictions:~~

(1) Nutrient offset credits may be used to satisfy regulatory obligations incurred in the upper Falls watershed only if they were generated by a nutrient reduction project located within the upper Falls watershed, as this geographic area is described in 15A NCAC 02B .0276.

(2) Nutrient offset credits may be used to satisfy regulatory obligations incurred in the lower Falls watershed only if they were generated by a nutrient reduction project located within the Falls Lake watershed, as these geographic areas are described in 15A NCAC 02B .0276.

(3) Nutrient offset credits may be used to satisfy regulatory obligations incurred in the Jordan Lake watershed only if they were generated by a nutrient reduction project in the same subwatershed of the Jordan watershed, as these geographic areas are described in 15A NCAC 02B.0262.

(4) Nutrient offset credits may be used to satisfy regulatory obligations incurred in the Neuse 01 8-digit cataloguing unit, as designated by the U.S. Geological Survey, below the Falls Lake watershed only if they were generated by a nutrient reduction project within that same geographic area.

(5) Nutrient offset credits generated by nutrient reduction projects for compliance with an estuarine nutrient strategy shall be generated in an area that is within or drains to:

(A) an assessment unit identified for restoration under the applicable nutrient-related TMDL or nutrient strategy, or

(B) an assessment unit classified as SA, SB, or SC that fails to meet the chlorophyll-a water quality standard in a subsequent integrated report.

~~(c) The Program and other parties shall obtain Division approval of proposed nutrient offset projects prior to construction. Other parties shall sell credits in compliance with approved credit release schedules and with the requirements of this Rule. Project approval shall be based on the following standards:~~

~~(1) Load reductions eligible for credit shall not include reductions used to satisfy other requirements under the same nutrient strategy;~~

~~(2) The Program and other parties shall agree to provide adequate financial assurance to protect and maintain load reductions for the stated duration, including for maintenance, repair and renovation of the proposed measure;~~

Commented [A59]: Rephrases and clarifies geographic restrictions from the original Paragraph (b). No change in effect.

Commented [A60]: NRCA May 2018 change. Minor effect in relation to May 2018 staff version of this rule. This provision was originally inserted to enable oyster or SAV restoration projects (if a credit can be established) while ensuring such projects are installed upstream of an impairment. Elimination of the term "in-water" expands this geographic restriction to land-based projects as well. Such expansion remains consistent with strategy purposes.

Commented [A61]: Process and standards for project approval have been expanded upon to reflect existing operating procedures. Analogous provisions found in (c), (e), and (g). Reorganization intended to reflect chronological nature of credit generation process.

~~(3) The Program and other parties shall agree that once credits are established for a measure and until they are exhausted, they shall provide a credit/debit ledger to the Division at regular intervals;~~

~~(4) The Program and other parties shall agree that the party responsible for a measure shall allow the Division access to it throughout its lifetime for compliance inspection purposes;~~

~~(5) The Program or other party seeking approval shall obtain a site review from Division staff prior to Division approval to verify site conditions suitable to achieve the proposed load reductions through the proposed measure; and~~

~~(6) The Program shall submit a proposal, and other parties shall submit a proposal or a draft banking instrument, addressing the following items regarding a proposed load-reducing measure:~~

(A) Identify the location and site boundaries of the proposed measure, the geographic area to be served by credits in compliance with the requirements of Paragraph (b) of this Rule, existing conditions in the contributing drainage area and location of the measure, and the nature of the proposed measure with sufficient detail to support estimates of load reduction required in this Paragraph;

(B) Provide calculations of the annual magnitudes of load reductions and identify final credit values incorporating any delivery factors or other adjustments required under rules identified in Paragraph (a) of this Rule;

(C) Define the duration of load reductions, and provide a conservation easement or similar legal mechanism to be recorded with the County Register of Deeds and that is sufficient to ensure protection and maintenance of load reductions for the stated duration;

(D) Identify the property owner and parties responsible for obtaining all permits and other authorizations needed to establish the proposed measure, for constructing and ensuring initial performance of the proposed measure, for reporting on and successfully completing the measure, for holding and enforcing the conservation easement, and for ensuring protection and maintenance of functions for its stated duration;

(E) Provide a plan for implementing the proposed measure, including a timeline, a commitment to provide an as-built plan and report upon establishment of the measure, elements to be included in the as-built plan and report, a commitment to provide a bond or other financial assurance sufficient to cover all aspects of establishment and initial performance prior to the release of any credits, and criteria for successful completion; and

(F) Provide a monitoring and maintenance plan designed to achieve successful completion, that commits to annual reporting to the Division until success is achieved, that recognizes the Division's authority to require extension or re-initiation of monitoring depending on progress toward success, and that commits to a final report upon completion. The final report shall reaffirm the party that shall hold and enforce the conservation easement or other legal instrument.

~~(c) NUTRIENT OFFSET CREDIT APPROVAL STANDARD. Providers shall demonstrate that a nutrient reduction project is designed, constructed, implemented and sustained in a manner that, according to the best available scientific evidence, studies and principles, will generate the estimated nutrient load reduction for the duration of time for which credits are approved. Nutrient offset credits shall be generated and transferred in accordance with G.S. 143-214.26.~~

Commented [A62]: New general standard that nutrient reduction projects must meet to generate nutrient offset credits.

~~(d) The Program shall establish and revise nutrient offset rates as set out in Rule .0274 of this Section. Offset payments accepted by the Program shall be placed into the Riparian Buffer Restoration Fund administered by the Department pursuant to G.S. 143-214.21~~

Commented [A63]: Restated in subparagraph (h)(1), reorganized with specific DMS-related provisions.

~~(d) QUANTIFYING NUTRIENT OFFSET CREDITS. The quantity of nutrient offset credits eligible to be generated by a nutrient reduction project shall be determined according to the following provisions:~~

(1) Nutrient reduction credit shall be calculated in relation to the following baseline nutrient loading conditions, as determined by the provider and verified by the Division:

(A) When credit is sought on developed land, it shall be awarded for load reductions achieved relative to the project site's current loading condition.

(2) Nutrient load reductions shall be site-specific estimates of decreases in annual mass load of nitrogen and/or phosphorus to the nearest receiving surface water feature. Such estimates shall be supported by the weight of evidence from available, current and applicable research, may involve water quality modeling or engineering formulas and calculations, and shall reflect as closely as possible project design specifications.

Commented [A64]: NRCA May 2018 change. Minor effect in relation to the May 2018 staff version of this rule in that it reduces transparency regarding baseline determinations. Nutrient reductions calculated for offset credit must be established from a baseline condition. Deletion of this provision requires the baseline condition for non-developed lands to be determined via agency policy, which is current practice.

(3) OPTION 1: Reductions shall not include those already implemented to satisfy other requirements under the same nutrient strategy; other local, state or federal requirements; or those resulting from state or federal compensatory mitigation requirements. Specifically, a nutrient reduction project shall not generate nutrient offset credits and stream, buffer or wetland mitigation credits in spatially overlapping areas.

OPTION 2: Unless specifically excepted in rule, reductions shall not include those already implemented to satisfy other requirements under the same nutrient strategy; other local, state or federal requirements; or those resulting from state or federal compensatory mitigation requirements. Specifically, a nutrient reduction project shall not generate nutrient offset credits

and buffer or wetland mitigation credits in spatially overlapping areas. However, restored forest buffer areas associated with stream mitigation projects may generate both stream and nutrient offset credits in spatially overlapping areas within 50 ft. from the top of the stream bank.

(4) Stream, buffer, or wetland mitigation credit that has not been used to satisfy a mitigation requirement may be converted into nutrient offset credit if the credit-generating project or portion thereof complies with this Rule.

(5) A nutrient reduction project may generate both nitrogen and phosphorus offset credits in the same area.

(6) A nutrient reduction project may be designed to generate permanent nutrient offset credit and/or term nutrient offset credit and shall specify which in the project plan. Permanent nutrient reduction credits and term nutrient reduction credits shall be maintained on separate ledgers, even if associated with the same nutrient offset bank or project.

(7) Permanent nutrient offset credits may be utilized for temporary compliance purposes. For each pound of annual term compliance credit received, 1/30th of one pound of permanent nutrient offset credit shall be utilized and retired by removal from the applicable ledger. This conversion shall also be subject to other applicable trading ratios.

(8) Nutrient offset credits that were approved prior to the adoption of this rule may make application to be reclassified. The Division shall approve the application of any bank to reclassify credits as permanent which meet the requirements for permanent credits at the time of the application to be reclassified. Other nutrient offset credits that were approved prior to the adoption of this rule or that were conditionally approved pursuant to a mitigation banking instrument or other agreement with DEQ prior to the adoption of this rule, are considered term credits and may be transferred between term and permanent ledgers at a ratio of 30 years of term nutrient offset credit to 1 (one) permanent nutrient offset credit.

(9) Term nutrient offset credits shall be associated with the calendar year or years in which the associated nutrient load reductions are generated.

~~(e) Persons who seek to pay nutrient offset fees under rules of this Section shall do so in compliance with such rules, the requirements of Paragraph (b) of this Rule, and the following:~~

~~(1) A non-governmental entity shall purchase nutrient offset credit from a party other than the Program if such credit is available in compliance with the criteria of this Rule at the time credit is sought, and shall otherwise demonstrate to the permitting authority that such credit is not available before seeking to make payment to the Program;~~

~~(2) Offset payments made to the Program shall be contingent upon acceptance of the payment by the Program. The financial, temporal and technical ability of the Program to satisfy the mitigation request will be considered to determine whether the Program will accept or deny the request;~~

~~(3) Where persons seek to offset more than one nutrient type, they shall make payment to address each type;~~

Commented [A65]: Two options are presented, one allowing nutrient offset credits and stream mitigation credits to be generated in the same spatial area and one prohibiting this practice (generally known as "credit stacking"). An earlier version of this rule prohibited nutrient/stream stacking and incorrectly characterized it as "existing policy." The Division has recieved mixed comments regarding the prior language and therefore both options are presented for public comment and the Committee's consideration.

Commented [A66]: Codifies existing practice. Buffer projects are often eligible for nutrient credit, and unused buffer credits may be converted into nutrient offset credit. Stream and wetland restoration are potentially creditable for nutrient offset credit purposes.

Commented [A67]: Permanent and temporary nutrient offset credits can be generated depending on the nature of the underlying nutrient reduction practice.

Commented [A68]: NRCA May 2018 change. No significant effect in relation to the May 2018 staff version of this rule but adds specificity. This provision originally provided the option for providers to transfer term credits supported by permanent projects to permanent ledgers. The inserted provision requires them to "make application" to the Division and explicitly provides the formerly implied standard for approval.

Commented [A69]: The provisions of this paragraph largely relate to nutrient offset credit transactions, and most provisions have been moved with light editing to Paragraph (i).

~~(4) The offset payment shall be an amount sufficient to fund 30 years of nutrient reduction.~~

~~(5) Persons who seek offsets to meet new development stormwater permitting requirements shall provide proof of offset credit purchase to the permitting authority prior to approval of the development plan; and~~

~~(6) A wastewater discharger that elects to purchase offset credits for the purpose of fulfilling or maintaining nutrient reduction requirements shall submit proof of offset credit acquisition or a letter of commitment from the Program or third party provider with its request for permit modification. Issuance of a permit that applies credits to nutrient limits shall be contingent on receipt of proof of offset credit acquisition. A discharger may propose to make incremental payments for additional nutrient allocations, contingent upon receiving a letter of commitment from the Program or third party provider to provide the offset credit needed for permit issuance. In that event the Division may issue or modify that permit accordingly, and shall condition any flow increase associated with that incremental purchase on payment in full for the additional allocation. Offset responsibility for nutrient increases covered under this Paragraph shall be transferred to the Program or third party provider when it has received the entire payment.~~

~~(e) PROJECT APPROVAL STANDARDS. Providers shall comply with the following requirements to request approval from the Division to implement a nutrient reduction project for the purpose of generating nutrient offset credits.~~

(1) NUTRIENT OFFSET BANKING INSTRUMENT. Providers except DMS seeking approval of a nutrient offset bank shall submit their draft nutrient offset banking instrument to the Division prior to seeking approval of project plans. A nutrient offset banking instrument shall provide legal and financial assurances that a provider will implement, maintain, and sustain nutrient reduction projects as proposed in subsequent project plans and associated nutrient reduction practice design specifications.

Commented [A70]: Codifies existing practice

(2) PROJECT PLAN REQUIREMENTS. Prior to initiating a nutrient reduction project, providers shall submit a project plan proposal to the Division for review and approval that includes the following elements:

Commented [A71]: Codifies existing practice, builds on provisions of original subparagraph (c)(6).

(A) Site location and site boundaries of the proposed project.

(B) The geographic area eligible to be served by nutrient offset credits in accordance with Paragraph (b) of this Rule and in compliance with applicable mitigation permit requirements.

(C) Documentation of the conditions of the site at the time of the submittal of the project plan.

(D) Documentation of the condition of the site during the baseline period of the applicable nutrient strategy.

(E) Description of the proposed project with sufficient detail to support compliance with the standard in Paragraph (c). Projects conforming to minimum design criteria for stormwater control measures in 15A NCAC 02H .1050 and 15A NCAC 02H .1051-.1062 meet this requirement. Design criteria for stormwater control measure variants and additional nutrient reduction practices established in the Division's Catalog of Nutrient Reduction Practices also meet this requirement.

Commented [A72]: Provides stormwater design criteria in rule sufficient to meet the standard set forth in (c), and are thus eligible to generate nutrient offset credits.

Commented [A73]: The Catalog of Nutrient Reduction Practices provides additional option eligible to generate permanent nutrient offset credits.

(F) Nutrient credit calculations in conformance with Paragraph (d) of this rule.

(G) Identification of the property owner and parties responsible for obtaining all permits and other authorizations needed to:

(i) establish the proposed project,

(ii) construct and ensure initial performance of the project,

(iii) report on and successfully complete the project,

(iv) hold and enforce all easement or other protection mechanisms, and

(v) ensure maintenance of the project for its credited duration.

(H) Description of how the project will be implemented, which shall include a timeline and a commitment to provide an as-built report upon the full project construction or installation.

(I) Description of how the project will be maintained and monitored after it has been installed and for its duration.

(J) Description of how the project will be sustained for its credited life, including a commitment to repair and renovate it as needed to maintain its performance, to keep records of all such operation, maintenance, monitoring, repair and renovation, and to notify the Division of any significant performance remediation needs and plans.

(K) Identification of federal or state grant funding contributing to project implementation.

(3) FINANCIAL ASSURANCES. Providers except DMS shall provide the financial assurance that a project plan will be completed as proposed. The financial assurance shall be in the form of a completion bond, credit insurance, letter of credit, escrow, or other vehicle acceptable to the Division, payable to, or for the benefit of, the Division, to ensure the involved property is secured in fee title or by easement and that planting or construction, monitoring and/or maintenance are completed as necessary to meet the requirements of the project plan.

Commented [A74]: NRCA May 2018 change. Deletion of this language removes an alternative financial assurance option for the named entity types.

(4) PROJECT PLAN APPROVAL. The Division shall approve the provider's project plan proposal after verifying the provider's compliance with Subparagraphs (e)(1), (2) and (3) of this rule and completing an onsite review to verify that preconstruction site conditions are suitable to generate the credits proposed by the project plan. However, the Division may partially or fully waive these requirements for term practices or projects if it determines that the burden of compliance is disproportionate to the value of the credits being generated and alternative means are used to satisfy the basic credit approval standard set forth in paragraph (c).

~~(f) Credits associated with load reducing activities funded under this Rule shall be awarded exclusively to the person, municipality, discharger, or group of dischargers who paid the offset fee.~~

~~(f) RELEASE AND ACCOUNTING FOR NUTRIENT OFFSET CREDITS. The Division shall release nutrient offset credits from an approved project in the following manner:~~

(1) The Division shall release credits to providers upon confirmation that project-specific milestones reflected in the project plan's credit release schedule have been met. Project-specific milestones for permanent nutrient offset credits shall conform to the following requirements:

(A) Credits shall not be released until the property is secured in fee title or by easement and financial assurance is posted for planting or construction of the project.

(B) No more than 50% of the credits shall be released for a project until financial assurance is provided for monitoring and maintenance activities lasting until project completion.

(C) No more than 80% of the credits shall be released for a project until the provider complies with the requirements of Paragraph (g).

(2) Once credits are released for a project and until they are exhausted, providers except for DMS shall provide a credit/debit ledger to the Division at regular intervals no less frequently than quarterly.

(3) The Division shall not release any credits for a project if that project is financed in whole or in part by state or federal grant funding.

Commented [A75]: Codifies major credit release milestones typically found in existing banking instruments.

Commented [A76]: In conjunction with the required disclosure provision in part (e)(2)(K), this subparagraph prevents public grant funds from being used to generate permanent nutrient offset credits or subsidize the nutrient offset market.

~~(g) MAINTAINING PERMANENT NUTRIENT OFFSET CREDITS. A provider shall transfer responsibility for oversight of a completed permanent project to a perpetual steward in accordance with this Paragraph and the approved project plan. A perpetual steward may also transfer responsibility to another perpetual steward in accordance with the terms of this Paragraph, subject to DWR approval. The provider shall ensure that the following mechanisms are in place to ensure that load reductions are sustained in perpetuity:~~

(1) The provider shall create and transfer to the perpetual steward a non-wasting endowment or other dedicated financial surety to provide for the oversight of the project's load reductions.

(2) For projects utilizing conservation easements, the provider shall acquire and then transfer a conservation easement to a perpetual steward in accordance with 16 U.S.C. 170(h) and the Conservation and Historic Preservation Agreements Act, G.S. 121-34 et seq. The terms of the conservation easement shall be consistent with a Division-approved template or be approved by the Division. Non-governmental perpetual stewards shall be accredited by the Land Trust Accreditation Commission.

(3) For projects utilizing stormwater control measures (SCMs), SCMs shall be placed in recorded drainage easements with recorded access easements to the nearest public right-of-way for purposes of operation and maintenance. These easements shall be granted in favor of the person or entity responsible for operating and maintaining the structures, with a note as to the responsible person or entity. Structure operation and maintenance shall be the responsibility of the landowner or easement holder unless the Division gives written approval for another person or entity. Easements shall be of sufficient width for inspection and maintenance of the project.

(4) The Division may temporarily or permanently invalidate permanent credits if it determines that the bank or project has been impacted due to failure to comply with the terms of an associated project plan, nutrient offset banking instrument, easement, maintenance agreement, or other protective agreement.

(5) Notwithstanding the other requirements of this Paragraph, a permanent project may be passively restored exclusively through natural ecological processes after project completion if:

(A) it is damaged by natural causes that could not have been prevented by the exercise of foresight or caution, and

(B) the practice employed is designed to restore a natural ecological community at the project site.

(h) RENEWING TERM NUTRIENT OFFSET CREDITS. Expiring term nutrient offset credits may be renewed by the provider upon providing documentation to the Division that the project meets the basic credit approval standard set forth in paragraph (c) for the duration of the renewal period.

~~(i) ADDITIONAL PROVISIONS REGARDING THE DIVISION OF MITIGATION SERVICES.~~

(1) DMS shall establish and revise nutrient offset rates as set out in 15A NCAC 2R .0602. Offset payments accepted by DMS shall be placed into the Riparian Buffer Restoration Fund administered by the Department pursuant to G.S. 143-214.21.

(2) On or before November 30 of each year, DMS shall provide an annual report to the Division concerning the nutrient in-lieu fee program that includes a requirement ledger. The requirement ledger shall include all nutrient offset credit requirements paid by 8-digit service area or for each

Commented [A77]: Clarifies existing practice that naturally restored communities do not have to be restored again after project completion due to natural causes. This provision reduces risk for the landowner and long-term steward and therefore reduces the amount for funding necessary for a non-wasting endowment by the provider.

geographic area identified in Paragraph (b), the date by which the requirement must be satisfied by a project, the requirement due date, and the projects and credits that have been applied to all requirements.

(3) Subject to the geographic restrictions in Paragraph (b), DMS may accept payments for nutrient offset credits prior to initiating projects. After accepting payment, DMS shall construct projects that, upon completion as described in the approved project plan, will generate nutrient offset credits sufficient to fulfill all new requirements generated by these payments. Such projects shall be instituted before the end of the first full state fiscal year after DMS receives payment and constructed before the end of the third full state fiscal year after DMS receives payment. DMS may also acquire credits from another provider to apply toward its requirements.

(4) If DMS fails to meet deadlines associated with project institution or construction as specified in Subparagraph (i)(3) of this Rule, then DMS shall develop an action strategy to include in the annual report specified in Subparagraph (i)(2) of this Rule. Action strategies shall include all of the following:

(A) a list of factors resulting in delays or deficiencies in procurement, project implementation and/or construction,

(B) specific actions and a timeline planned by DMS to satisfy outstanding credit requirements such that a project will be instituted before the end of the first full state fiscal year after the action strategy is submitted to the Division in the annual report and constructed before the end of the third full state fiscal year after the action strategy is submitted to the Division in the annual report, unless otherwise specified in the action strategy,

(C) the anticipated date by which all outstanding nutrient offset credit requirements will be satisfied, and

(D) an evaluation of current progress in relation to prior action strategies if applicable.

~~(j) NUTRIENT OFFSET CREDIT TRANSACTIONS. Parties who seek to acquire nutrient offset credits under rules of this Subchapter shall do so in compliance with such rules, the requirements of Paragraph (b) of this rule, G.S. 143-214.26, and the following:~~

Commented [A78]: Many provisions from the original paragraph (e) were reorganized and edited in this section.

(1) Offset payments made to DMS shall be contingent upon acceptance of the payment by DMS. DMS shall consider its financial, temporal and technical ability to satisfy the request to make its determination.

(2) Where persons seek to satisfy regulatory obligations for more than one nutrient type, they shall acquire nutrient reduction credits to address each type.

(3) Projects must be approved and the associated offset credits released by the Division before they may be utilized for NPDES wastewater permit compliance purposes.

(4) For offset credits used to meet the discharge requirements, the applicant shall provide 10% additional credits to address the uncertainty factor for using unmonitored nonpoint source reductions to meet point source discharge limits. For offset credits used to meet the discharge requirements, the applicant shall provide no additional credits to address the uncertainty factor for using monitored nonpoint source reductions to meet point source discharge limits.

Application of this ratio is in addition to other ratios that may be applied, including delivery or transport factors where applicable.

(5) Delivery factors shall be applied to estimate nutrient reductions to an impaired water body subject to a nutrient strategy if required under rules of this Subchapter for that strategy.

(6) Term credits may be utilized for compliance only during the year in which they are generated as described in subparagraph (d)(2). They may not be cumulatively banked for future years.

~~(k) DEVELOPER-RESPONSIBLE NUTRIENT OFFSET PROJECTS. A developer subject to new development stormwater requirements of this Subchapter may satisfy its nutrient reduction obligations by generating its own offsite credits. It may do so by establishing a nutrient offset bank and generating credits in accordance with this rule. Alternatively, the developer shall comply with all provisions of this rule governing the generation of nutrient offset credits by a provider with the following modifications:~~

(1) Instead of a credit release schedule, credit for the project may be assigned upon construction of the project and submission of the as-built report as described in the project plan;

(2) Credit shall be assigned at a 50% rate based on the design specifications of the fully completed project(s); and

(3) Liability for the generation of credits as described in the project plan remains with the developer until the completion of all milestones associated with the project.

~~(l) NPDES WASTEWATER PERMITTEE RESPONSIBLE NUTRIENT OFFSET PROJECTS. A locality, authority, utility, or sanitation district operating a permitted wastewater facility subject to wastewater rules of this Subchapter may generate nutrient offset credits by installing projects in accordance with this rule. Any credits generated may then be utilized for compliance purposes as if acquired from another provider.~~

History Note: *Authority G.S. 143-214.1; 143-214.20; 143-214.21; 143-214.26; S.L. 1995, c. 572; S.L. 2007, c. 438; S.L. 2009, c. 337; S.L. 2009, c. 484; S.L. 2009, c. 486;*

Eff. August 1, 1998;
Amended Eff. August 1, 2006;
Amended Eff. September 1, 2010.
Amended Eff. [New Date].

Commented [A79]: NRCA May 2018 change. These substitutions would have the following material effects:
1. Removes trading ratio options before providing an opportunity for public comment and before a a fiscal analysis is completed.
2. Reduces the trading ratio well below national norms of 2 or 3 to 1 without specific justification. The use of a 1.1 to 1 ratio resulted in federal intervention in Pennsylvania, which now utilizes a 3:1 ratio.
3. The offset rule requires all projects to be monitored in only a generic sense. Currently, such monitoring typically requires a visual inspection of the project. By not specifying water quality monitoring or establishing standards for such monitoring, a de facto elimination of the trading ratio may result.

Commented [A80]: New option for developer-responsible offset option analagous to permittee-responsible mitigation. Allows credit to be taken immediately after project construction, but at a potentially reduced rate.

Commented [A81]: New option for NPDES permittee-responsible offset option analagous to permittee-responsible mitigation.

15A NCAC 02B .0255 is proposed for repeal as follows:

15A NCAC 02B .0255 TAR-PAMLICO RIVER BASIN - NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: AGRICULTURAL NUTRIENT LOADING GOALS

Commented [A82]: Change: Rule to be repealed.

Effect: Goals information moved to Agriculture Rule .0732

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C;*

Eff. April 1, 2001.

Repealed Eff. [New Date]

15A NCAC 02B .0256 is proposed for amendment as follows:

15A NCAC 02B ~~.0256~~ .0732 TAR-PAMLICO RIVER ~~BASIN NUTRIENT SENSITIVE WATERS MANAGEMENT~~ BASIN NUTRIENT STRATEGY: ~~AGRICULTURAL NUTRIENT CONTROL STRATEGY~~ AGRICULTURE

~~(a) PURPOSE.~~ The purpose of this Rule is to set forth a process by which agricultural operations in the Tar-Pamlico River Basin will collectively limit their nitrogen and phosphorus loading to the Pamlico estuary. The purpose is to achieve and maintain a 30 percent reduction in collective nitrogen loading from 1991 levels within five to eight years and to hold phosphorus loading at or below 1991 levels within four years of Commission approval of a phosphorus accounting methodology. ~~The purpose of this Rule is to maintain or exceed the percentage reduction goals defined in Rule .0730 of this Section for the collective agricultural loading of nitrogen and phosphorus from the 1991 baseline levels, to the extent that best available accounting practices will allow, on all lands used for agricultural production as described in Paragraph (b) of this Rule. This Rule requires persons engaging in agricultural operations in the Basin to implement land management practices that will collectively, on a basin basis, achieve and maintain strategy nutrient reduction goals of a 30 percent reduction in nitrogen loading from 1991 levels and no increase in phosphorus loading from 1991 levels. Local committees and a Basin committee will coordinate activities and account for progress.~~

(1) PROCESS. This Rule requires farmers in the Basin to implement land management practices that collectively, on a county or watershed basis, will achieve the nutrient goals. ~~Local committees and a Basin committee will develop strategies, coordinate activities and account for progress.~~

(2) LIMITATION. This Rule may not fully address the agricultural nitrogen reduction goal of the Tar-Pamlico Nutrient Sensitive Waters Strategy in that it does not address atmospheric sources of nitrogen to the Basin, including atmospheric emissions of ammonia from sources located both within and outside of the Basin. As better information becomes available from ongoing research on atmospheric nitrogen loading to the Basin from these sources, and on measures to control this loading, the Commission may undertake separate rule-making to require such measures it deems necessary from these sources to support the goals of the Tar-Pamlico Nutrient Sensitive Waters Strategy.

~~(b) APPLICABILITY.~~ This Rule shall apply to all persons engaging in agricultural operations in the Tar-Pamlico River Basin except certain persons engaged in such operations for educational purposes. Persons engaged for educational purposes shall be those persons involved in secondary school or lesser grade-level activities that are a structured part of an organized program conducted by a public or private educational institution or by an

Commented [A83]: Change: Deleted text. The role and responsibilities of the local committees is now addressed in Subparagraph (e)(3)

Effect: Streamlines content. No Substantive Change.

Commented [A84]: Change: Revised to capture substance of proposed repealed rule 02B .0255, which set the reduction goal for agriculture.

Effect: Streamlined content. No substantive change.

agricultural organization. Educational activities shall not include research activities in support of commercial production. ~~This Rule shall apply to all persons engaging in agricultural operations, generally including those related to crops, horticulture, livestock, and poultry, in the geographic area subject to the Tar-Pamlico nutrient strategy as described in Rule .0730 of this Section.~~ This Rule applies to livestock and poultry operations above the size thresholds in this Item in addition to requirements for animal operations set forth in general permits issued pursuant to G.S. 143-215.10C. Nothing in this Rule shall be deemed to allow the violation of any assigned surface water, groundwater, or air quality standard by any agricultural operation, including any livestock or poultry operation below the size thresholds in this Item. Nothing in this Rule shall be deemed to allow the violation of any assigned surface water, groundwater, or air quality standard by any agricultural operation, including any livestock or poultry operation below the size thresholds in this Item. ~~For the purposes of this Rule, agricultural operations are activities that relate to any of the following pursuits:~~

(1) The commercial production of crops or horticultural products other than trees. As used in this Rule, commercial shall mean activities conducted primarily for financial profit.

(2) Research activities in support of such commercial production.

(3) The production or management of any of the following number of livestock or poultry at any time, excluding nursing young:

(A) 20 or more horses;

(B) 20 or more cattle;

(C) 150 or more swine;

(D) 120 or more sheep;

(E) 130 or more goats;

(F) 650 or more turkeys;

(G) 3,500 or more chickens; or

(H) ~~A number of any~~ Any single species of any other livestock or poultry, or any combination of species of livestock or poultry that exceeds 20,000 pounds of live weight at any time.

Commented [A85]: Change: Added specificity to applicability description and size thresholds for livestock to conform with Tar-Pamlico ag rule.

Effect: Reduces uncertainty, narrows scope of applicability

(4) Certain tree-harvesting activities described and defined as follows.

(A) The one-time harvest of trees on land within a riparian buffer described in 15A NCAC 02B ~~.0259~~ .0734 that was open farmland on September 1, 2001. This one-time harvest

of trees may be conducted within one tree cropping interval only under a verifiable farm plan that received final approval from a local agricultural agency on or after September 1, 2001 and that expressly allowed the harvest of trees no earlier than 10 years after the trees are established and the return of the land to another agricultural pursuit.

(B) The one-time harvest of trees on land within a riparian buffer described in 15A NCAC 02B ~~0259~~ .0734 that had trees established under an agricultural incentive program as of September 1, 2001.

(C) All tree harvesting described in Subparagraphs (b)(4)(A) and (b)(4)(B) of this Rule shall comply with Forest Practices Guidelines Related to Water Quality codified at ~~15A NCAC 01I.~~02 NCAC 60C. The nutrient removal functions that were provided by trees prior to their harvest shall be replaced by other measures that are implemented by the owner of the land from which the trees are harvested.

(D) The following definitions shall apply to terms used in Subparagraphs (b)(4)(A) through (b)(4)(C) of this Rule.

(i) "Agricultural incentive program" means any of the following programs and any predecessor program to any of the following programs:

(I) Agriculture Cost Share Program for Nonpoint Source Pollution Control established by G.S. 143-215.74.

(II) Conservation Reserve Enhancement Program established by 7 C.F.R. Part 1410 (January 1, 2001 Edition) and 15A NCAC 06G .0101 through 15A NCAC 06G .0106.

(III) Conservation Reserve Program established by 7 C.F.R. Part 1410 (January 1, 2001 Edition).

(IV) Environmental Quality Incentives Program established by 7 C.F.R. Part 1466 (January 1, 2001 Edition).

(V) Wetlands Reserve Program established by 7 C.F.R. Part 1467 (January 1, 2001 Edition).

(VI) Wildlife Habitat Incentives Program established by 7 C.F.R. Part 636 (January 1, 2001 Edition).

(ii) "Local agricultural agency" means the North Carolina Cooperative Extension Service, the Farm Services Agency of the United States Department of Agriculture, the Natural Resources Conservation Service of the United States

Department of Agriculture, a Soil and Water Conservation District created pursuant to G.S. 139-5, or their successor agencies.

(iii) "Open farmland" means the footprint of land used for pasture or for crops or horticultural products other than trees. Open farmland may contain scattered trees if an open canopy existed on September 1, 2001 as determined from the most recent aerial photographs taken prior to September 1, 2001 for the Farm Services Agency of the United States Department of Agriculture.

(iv) "Tree" means a woody plant with a diameter equal to or greater than five inches when measured at a height of four and one-half feet above the ground.

(v) "Tree cropping interval" means the time required to establish and grow trees that are suitable for harvesting. The tree-cropping interval shall be set out in the farm plan and shall be no less than 10 years after the trees are established.

~~(c) IMPLEMENTATION PROCESS.~~ This Rule shall be implemented through a cooperative effort between a Basin Oversight Committee and Local Advisory Committees in each county or watershed. ~~A Basin Oversight Committee and county-level Local Advisory Committees shall coordinate activities and account for progress. The membership, roles and responsibilities of these committees are set forth in Paragraphs~~ (f) ~~(d)~~ and (g) ~~(e) of this Rule.~~ Committees' activities shall be guided by the following constraints: ~~Accounting for nutrient-reducing actions on agricultural lands within the basin shall follow requirements set forth in Subparagraph (d)(3) of this Rule. Producers may be eligible to obtain cost share and technical assistance from the NC Agriculture Cost Share Program and similar federal programs to contribute to their counties' ongoing nutrient reductions. Committee activity shall be guided by the following:~~

~~(1) The Commission shall determine whether each Local Advisory Committee has achieved its nitrogen reduction goal within five years of the effective date of this Rule, and its phosphorus loading goal within four years of the date that a phosphorus accounting method is approved by the Commission, both based on the accounting process described in Paragraphs (f) and (g) of this Rule. Should the Commission determine that a Local Advisory Committee has not achieved its nitrogen goal within five years, then the Commission shall require additional BMP implementation as needed to ensure that the goal is met within eight years of the effective date of this Rule. The Commission shall similarly review compliance with the phosphorus goal four years after it approves a phosphorus accounting method, and shall require additional BMP implementation as needed to meet that goal within an additional three years from that date. All persons subject to this Rule who have not implemented BMPs in accordance with an option provided in Subparagraphs (d)(1) or (d)(2) of this Rule shall be subject to such further~~

~~requirements deemed necessary by the Commission for any Local Advisory Committee that has not achieved a nutrient goal.~~

~~(2) Should a committee not form or not follow through on its responsibilities such that a local strategy is not implemented in keeping with Paragraph (g) of this Rule, the Commission may require all persons subject to this Rule in the affected area to implement BMPs as set forth in Paragraph (c) of this Rule.~~

(1) OPTIONS FOR INDIVIDUAL OPERATIONS. Persons subject to this Rule may elect to implement practices meeting the standards identified in Paragraph (f) of this Rule that contribute to maintenance of collective local compliance with the goal identified in Paragraph (a) of this Rule, but are not required to implement any specific practices provided their basin collectively maintains compliance with the goal.

(2) MAINTENANCE OF GOAL. Accounting shall annually demonstrate maintenance or exceedence of the nitrogen reduction goal for the basin. Where three sequential annual reports show that the Basin did not meet its nitrogen and phosphorus reduction goals, the Basin Oversight Committee shall work with the Division of Soil and Water Conservation and Local Advisory Committees, particularly those representing counties not meeting the goals, to seek reduction actions by operations to bring agriculture collectively back into compliance, and shall report on their efforts in subsequent annual reports. Should subsequent annual reports not reverse the trend of non-compliance, the Commission may seek a more specific implementation plan from the Basin Oversight Committee, which may include an assessment of need for specific action by the Commission.

(d) OPTIONS FOR MEETING RULE REQUIREMENTS. Persons subject to this Rule shall register their operations with their Local Advisory Committee according to the requirements of Paragraph (g) of this Rule within one year of the effective date of this Rule. Such persons may elect to implement any BMPs they choose that are recognized by the Basin Oversight Committee as nitrogen-reducing BMPs within five years of the effective date of this Rule. Persons who implement one of the following two options within five years of the effective date of this Rule for nitrogen-reducing BMPs and within four years of the date that a phosphorus accounting method is approved by the Commission shall not be subject to any additional requirements that may be placed on persons under Paragraph (c) of this Rule. Persons subject to this Rule shall be responsible for implementing and maintaining the BMPs used to meet the requirements of this Rule for as long as they continue their agricultural operation. If a person ceases an operation and another person assumes that operation, the new operator shall be responsible for implementing BMPs that meet the requirements of this Paragraph.

Commented [A86]: Change: Part of content reorganization/streamlining consistent with other ag rules.

Effect: Clarity, brevity. No substantive change

Commented [A87]: Change: Added language clarifying individual's ability to meet requirements through the collective compliance approach.

Effect: Improved clarity. No Impact.

Commented [A88]: Change: Adds express ability for EMC to seek corrective action.

Effect: Probably no practical difference.

~~(1) Option 1 is to implement site-specific BMPs that are accepted by the Local Advisory Committee as fully satisfying a person's obligations under this Rule based on BMP implementation needs identified in the local nutrient control strategy required under Subparagraph (g)(3)of this Rule and on nutrient reduction efficiencies established by the Basin Oversight Committee as called for under Subparagraphs (f)(2) and (f)(3) of this Rule.~~

(2) Option 2 is to implement standard BMPs that persons subject to this Rule choose from the alternatives established pursuant to Paragraph (e) of this Rule.

(e) STANDARD BEST MANAGEMENT PRACTICES (BMPs). Standard BMPs shall be individual BMPs or combinations of BMPs that achieve at least a 30 percent reduction in nitrogen loading and no increase in phosphorus loading relative to conditions that lack such BMPs. Standard BMPs shall be established for the purposes of this Rule by one of the following processes:

~~(1) The Soil and Water Conservation Commission may elect to approve, under its own authorities, standard BMP options for the Tar-Pamlico River Basin based on nutrient reduction efficiencies established by the Basin Oversight Committee pursuant to Subparagraph (f)(3) of this Rule and using criteria for nitrogen- and phosphorus-reducing BMPs as described in rules adopted by the Soil and Water Conservation Commission, including 15A NCAC 06E .0104 and 15A NCAC 06F .0104. One purpose of this process is to provide persons subject to this Rule the opportunity to work with the Soil and Water Conservation Commission in its development of standard BMP options; or~~

~~(2) In the unlikely event that the Soil and Water Conservation Commission does not approve an initial set of standard BMP options for the Tar-Pamlico River Basin within one year of the effective date of this Rule, then the Environmental Management Commission may approve standard BMP options within eighteen months of the effective date of this Rule. In that event, the standard BMP options approved by the Commission shall be designed to reduce nitrogen and phosphorus loading, as specified at the beginning of Paragraph (e) of this Rule, from agricultural sources through structural, management, or buffering farming BMPs or animal waste management plan components.~~

~~(f) (d) BASIN OVERSIGHT COMMITTEE. The Basin Oversight Committee shall have the following membership, role and responsibilities:~~

(1) MEMBERSHIP. ~~The Commission shall~~ ~~delegate to the Secretary the responsibility of forming a Basin Oversight Committee within two months of the effective date of this Rule. Members shall be appointed for five-year terms and shall serve at the pleasure of the Secretary.~~ ~~Until such time~~

Commented [A89]: **Change:** Language removed to reflect current implementation status through the collective compliance approach. Eliminates individual option of standard BMPs vs. collective compliance.

Effect: No practical Impact

~~as the Commission determines that long-term maintenance of the nutrient loads is assured, the Secretary shall either reappoint members or replace members every five years. The Secretary~~ shall ~~solicit nominations for membership on this Committee to represent each of the following interests, from interested parties, and shall appoint one nominee to represent~~ maintain one member for each ~~interest. The Secretary may appoint a replacement at any time for an interest in Parts (f)(1)(F) through (f)(1)(J) of this Rule upon request of representatives of that interest:~~ The Director of the Division of Water Resources shall be responsible for maintaining the following membership composition. Until such time as the Commission determines that long-term compliance with this rule is assured, the Director shall solicit one nomination for membership on this Committee from each agency in Sub-Paragraphs (d)(1)(A) through (d)(1)(E). The Director may appoint a replacement at any time for an interest in Sub-Paragraphs (d)(1)(F) through (d)(1)(I) upon request of representatives of that interest or by the request of the Commissioner of Agriculture:

(A) Division of Soil and Water Conservation;

(B) United States Department of Agriculture-Natural Resources Conservation Service (shall serve in an "ex-officio" non-voting capacity and shall function as a technical program advisor to the Committee);

(C) North Carolina Department of Agriculture and Consumer Services;

(D) North Carolina Cooperative Extension Service;

(E) Division of Water ~~Quality,~~ Resources,

(F) Up to two ~~Environmental~~ environmental interests;

(G) Basinwide farming interests;

(H) Pasture-based livestock interests; ~~and~~

(I) Cropland farming interests; and General farming interests; and

~~(J)~~(I) The scientific community with experience related to water quality problems in the Tar-Pamlico River Basin.

(2) ROLE. The Basin Oversight Committee shall:

(A) Develop a tracking and accounting methodology pursuant to Subparagraph (f)(3) of this Rule. A final nitrogen methodology shall be submitted to the Commission for approval

Commented [A90]: Change: Added an additional environmental representative and to the Committee Membership. Provided process for appointing members to fill empty seats.

Effect: Consistency of interests represented across watersheds. Improved clarity on process for appointing new members. No Impact on rule implementation.

Commented [A91]: Change: Updated the language addressing accounting methodologies recognizing the Basin Oversight Committee has developed tools currently used for tracking progress with the required reduction goals.

Effect: Improved clarity and brings the rule language up to date reflecting how the rule requirements are being implemented.

within one year after the effective date of this Rule. A final methodology for phosphorus shall be submitted at the earliest date possible as determined by the Basin Oversight Committee with input from the technical advisory committee described in Part (f)(2)(D) of this Rule.

(A) Continue to review, approve and summarize local nitrogen and phosphorus reduction annual reports to ensure ongoing implementation of the accounting methods approved by the Commission under the original version of this Rule in October 2002 for nitrogen and November 2005 for phosphorus as conforming to the requirements of Subparagraph (d)(3) of this Rule. Continue to present these reports as initiated in 2002, to the Director annually;

(B) Take actions called for under Subparagraphs (c)(2) as needed to address maintenance of the nitrogen and phosphorus reductions goals;

(C) Identify and implement future refinements to the accounting methodology as needed to reflect advances in scientific understanding, including establishment of nutrient reduction efficiencies for BMPs.

(D) ~~Appoint a~~ Reassemble as needed a phosphorus technical advisory committee ~~within 6 months of the effective date of this Rule~~ to update the qualitative phosphorus method approved by the Commission in October 2005, titled Accounting Method for Tracking Relative Changes in Agricultural Phosphorus Loading to the Tar-Pamlico River, in order to revise phosphorus baseline values and annual changes in factors affecting agricultural phosphorus loss. ~~to inform the Basin Oversight Committee on rule-related issues. The Basin Oversight Committee shall direct the committee to take the following actions at a minimum: monitor advances in scientific understanding related to phosphorus loading, evaluate the need for additional management action to meet the phosphorus loading goal, and report its findings to the Basin Oversight Committee on an annual basis. The Basin Oversight Committee shall in turn report these findings and its recommendations to the Commission on an annual basis following the effective date of this Rule, until such time as the Commission, with input from the Basin Oversight Committee, determines that the technical advisory committee has fulfilled its purpose. The Basin Oversight Committee shall solicit nominations for this committee from the Division of Soil and Water Conservation, United States Department of Agriculture-Natural Resources Conservation Service, North Carolina Department of Agriculture and Consumer Services, North Carolina Cooperative Extension Service, Division of Water Quality, environmental~~

~~interests, agricultural interests, and the scientific community with experience related to the committee's charge.~~

(D) Review, approve and summarize county or watershed local strategies and present these strategies to the Commission for approval within two years after the effective date of this Rule.

(E) Establish minimum requirements for, review, approve and summarize local nitrogen and phosphorus loading annual reports as described under Subparagraph (g)(5) of this Rule, and present these reports to the Commission each October, until such time as the Commission determines that annual reports are no longer needed to assure long-term maintenance of the nutrient goals.

(3) ACCOUNTING METHODOLOGY. The Basin Oversight Committee shall develop an accounting methodology that meets the following requirements:

Commented [A92]: Change: Updated the language addressing accounting methodologies recognizing the Basin Oversight Committee has developed tools currently used for tracking progress with the required reduction goals.

Effect: Improved clarity and brings the rule language up to date reflecting how the rule requirements are being implemented.

(A) The methodology shall quantify baseline total nitrogen and phosphorus loadings from agricultural operations in each county and for the entire basin.

(B) The methodology shall include a means of tracking implementation of BMPs, including number, type, and area affected.

(C) The methodology shall include a means of estimating incremental nitrogen and phosphorus reductions from actual BMP implementation and of evaluating progress toward the nutrient goals from BMP implementation. The methodology shall include nutrient reduction efficiencies for individual BMPs and combinations of BMPs that can be implemented toward the nitrogen and phosphorus goals.

(D) The methodology shall allow for future refinements to the nutrient baseline loading determinations, and to the load reduction accounting methodology.

(E) The methodology shall provide for quantification of changes in nutrient loading due to changes in agricultural land use, modifications in agricultural activity, or changes in atmospheric nitrogen loading to the extent allowed by advances in technical understanding.

(F) The methodology shall include a method to track maintenance of the nutrient net loads after the initial eight years of this Rule, including tracking of changes in BMPs and

additional BMPs to offset new or increased sources of nutrients from agricultural operations.

Success in meeting this Rule's purpose will be gauged by estimating percentage changes in nitrogen loss from agricultural lands in the Tar-Pamlico Basin and by evaluating broader trends in indicators of phosphorus loss from agricultural lands in the Tar-Pamlico Basin. The Basin Oversight Committee shall develop maintain, and update as indicated elsewhere in this Paragraph, accounting methods that meet the following requirements:

(A) The nitrogen method shall estimate baseline and annual total nitrogen losses from agricultural operations in each county and for the entire Tar-Pamlico Basin. Baseline losses and relative loss reduction progress shall be adjusted as frequently as can be supported by available data to account for lands permanently removed from agricultural control through development;

(B) The nitrogen and phosphorus methods shall include a means of tracking implementation of BMPs, including number, type, and area affected;

(C) The nitrogen method shall include a means of estimating incremental nitrogen loss reductions from implementation of BMPs that conform to requirements of Paragraph (g) of this Rule and of evaluating progress toward and maintenance of the nutrient objectives from changes in BMP implementation, fertilization, and changes in individual crop acres;

(D) The nitrogen and phosphorus methods shall be refined as research and technical advances allow; and

(E) The phosphorus method shall quantify baseline values for and annual changes in factors affecting agricultural phosphorus loss as identified in the report by the phosphorus technical advisory committee described elsewhere in this Paragraph.

~~(g)~~(e) LOCAL ADVISORY COMMITTEES. The Local Advisory Committees shall have the following membership, roles, and responsibilities:

(1) MEMBERSHIP. ~~A~~ Per S.L. 2001, c. 355, a Local Advisory Committee shall be ~~appointed~~ maintained as provided in this Paragraph in each county ~~(or~~ or watershed as specified by the Basin Oversight ~~Committee)~~ Committee, within the Tar-Pamlico River Basin. ~~As directed by S.L. 2001, c. 355, the Local Advisory Committees shall be appointed on or before November 1, 2001.~~ They shall terminate upon a finding by the ~~Environmental Management~~ Commission that the

Commented [A93]: Change: Added language calling for evaluation and adjustment of baseline losses and relative loss reduction progress based on data availability to address agricultural land lost to development.

Effect: Agriculture's reduction progress will be measured against an updated baseline that reflects the nutrient contributions from lands still within the Agriculture universe. Fiscal impact will be evaluated during rulemaking process.

long-term maintenance of nutrient loads in the Tar-Pamlico River Basin is assured. Each Local Advisory Committee shall consist of:

(A) One representative of the local Soil and Water Conservation District;

(B) One local representative of the United States Department of Agriculture- Natural Resources Conservation Service;

(C) One local representative of the North Carolina Department of Agriculture and Consumer Services;

(D) One local representative of the North Carolina Cooperative Extension Service;

(E) One local representative of the North Carolina Division of Soil and Water Conservation; and

(F) ~~At least five, but not more than 10 farmers who reside in the county or watershed.~~ At least two farmers that reside in the county.

(2) APPOINTMENT OF MEMBERS. ~~The~~ Per S.L. 2001, c. 355, the Director of the Division of Water ~~Quality~~ Resources and the Director of the Division of Soil and Water Conservation of the Department of ~~Environment and Natural Resources~~ Agriculture and Consumer Services shall jointly appoint members described in Subparagraphs (e)(1)(A), (e)(1)(B), (e)(1)(D), and (e)(1)(E) of this Rule. As directed by S.L. 2001, c. 355, the Commissioner of Agriculture shall appoint the members described in Subparagraphs (e)(1)(C) and (e)(1)(F) of this Rule from persons nominated by nongovernmental organizations whose members produce or manage significant agricultural commodities in each county or watershed. Members of the Local Advisory Committees shall serve at the pleasure of their appointing authority.

(3) ROLE. The Local Advisory Committees shall:

(A) Continue to submit annual reports to the Basin Oversight Committee estimating total crop production on agricultural operations for the preceding calendar year, summarizing land use changes in the county and making recommendations to the Basin Oversight Committee on the need for updates to the accounting methodology. Reports shall include documentation on the BMPs implemented, including type and location, that satisfy the requirements identified in Paragraph (f) of this Rule and documentation of any expired contracts for BMPs; and

(B) Take actions called for under Subparagraph (c)(2) as needed to address maintenance of the nitrogen and phosphorus reduction goals.

~~(A) Conduct a registration process for persons subject to this Rule. This registration process shall be completed within one year after the effective date of this Rule. It shall obtain information that~~

Commented [A94]: Change: Technical corrections updating Session Law References and Agency names.

Effect: No Impact. Improved Clarity

Commented [A95]: Change: Updates role of the local advisory committees LACs.

Effect: No Impact. Brings rule language up to date and better reflects how requirements are currently being implemented.

~~shall allow Local Advisory Committees to develop local strategies in accordance with Subparagraph (g)(4) of this Rule. At minimum, the registration process shall request the type and acreage of agricultural operations, nutrient-reducing BMPs implemented since January 1, 1992 and their operational status, and the acres affected by those BMPs. It shall provide persons with information on requirements and options under this Rule, and on available technical assistance and cost share options;~~

(B) Designate a member agency to compile and retain copies of all individual plans produced to comply with this Rule;

(C) Develop local nutrient control strategies for agricultural operations, pursuant to Subparagraph (g)(4) of this Rule, to meet the nitrogen and phosphorus goals assigned by the Basin Oversight Committee. The nitrogen component of the control strategy shall be submitted to the Basin Oversight Committee no later than twenty-three months from the effective date of this Rule. The phosphorus component of the control strategy shall be submitted within one year of the date that the Commission approves a phosphorus accounting methodology as described in Part (f)(2)(A) of this Rule;

(D) Ensure that any changes to the design of the local strategy will continue to meet the nutrient goals of this Rule; and

(E) Submit annual reports to the Basin Oversight Committee, pursuant to Subparagraph (g)(5) of this Rule, each May until such time as the Commission determines that annual reports are no longer needed to assure long-term maintenance of the nutrient goals.

~~(4) LOCAL NUTRIENT CONTROL STRATEGIES. The Local Advisory Committees shall be responsible for developing county or watershed nutrient control strategies that meet the following requirements. If a Local Advisory Committee fails to submit a nutrient control strategy as required in Part (g)(3)(C) of this Rule, the Commission may develop one based on the accounting methodology that it approves pursuant to Part (f)(2)(A) of this Rule.~~

(A) Local nutrient control strategies shall be designed to achieve the required nitrogen reduction goals within five years after the effective date of this Rule, and to maintain those reductions in perpetuity or until such time as this Rule is revised to modify this requirement. Strategies shall be designed to meet the phosphorus loading goals within four years of the date that the Commission approves a phosphorus accounting methodology as described in Part (f)(2)(A) of this Rule.

(B) Local nutrient control strategies shall specify the numbers and types of all agricultural operations within their areas, numbers of BMPs that will be implemented by enrolled operations and acres to be affected by those BMPs, estimated nitrogen and phosphorus reductions, schedule for BMP implementation, and operation and maintenance requirements.

(C) Local nutrient control strategies may prioritize BMP implementation to establish the most efficient and effective means of achieving the nutrient goals.

~~(5) ANNUAL REPORTS. The Local Advisory Committees be responsible for submitting annual reports for their counties or watersheds. Annual reports shall be submitted to the Basin Oversight Committee each May until such time as the Commission determines that annual reports are no longer needed to assure long-term maintenance of the nutrient goals. Annual reports shall quantify progress toward the nutrient goals with sufficient detail to allow for compliance monitoring at the farm level. The Basin Oversight Committee shall determine reporting requirements to meet these objectives. Those requirements may include information on BMPs implemented by individual farms, proper BMP operation and maintenance, BMPs discontinued, changes in agricultural land use or activity, and resultant net nutrient loss changes.~~

(f) PRACTICE STANDARDS. To receive nutrient reduction credit under the accounting methods described elsewhere in this Rule, a BMP shall be included in the accounting method approved by the Commission under the original version of this Rule effective September 2001, or in a subsequent revision to that method identified in annual reporting, and it shall be implemented according to applicable nutrient-related standards identified by the BOC and established by the NC Soil and Water Conservation Commission or the USDA-Natural Resources Conservation Service in North Carolina.

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; S.L. 2001-355; S.L. 1997-458;*

Eff. September 1, 2001;

Temporary Amendment Eff. January 1, 2002 (exempt from 270 day requirement-S.L. 2001-355).

Amended Eff. [New Date].

Commented [A96]: Change: Removed language related to activities the Local Advisory Committees have already completed. Updated language on LAC's role provided in Sub-paragraph (e)(3)(A).

Effect: No practical impact. Brings rule language up to date.

Commented [A97]: Change: Annual Reporting language has been moved to Subparagraph (d)(2)(a).

Effect: No Impact

Commented [A98]: Change: Adds practice standards requirements for BMPs and reference agencies that provide standards for Agricultural BMPs.

Effect: Ensures proper BMP implementation and use of approved accounting methods to earn nutrient reduction credit.

15A NCAC 02B .0257 is proposed for repeal as follows:

15A NCAC 02B .0257 TAR-PAMLICO RIVER BASIN - NUTRIENT SENSITIVE WATERS MANAGEMENT STRATEGY: NUTRIENT MANAGEMENT

History Note: *Authority G. S. 143-214.1; 143-214.7; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; 143B-282(d);*

Eff. April 1, 2001.

Repealed Eff. [New Date]

Commented [A99]: Change: Rule to be repealed.

Effect: Removed both an unenforceable requirement (all fertilization according to approved plans) and already completed requirement (Extension training).

15A NCAC 02B .0258 is proposed for amendment as follows:

15A NCAC 02B ~~.0258~~ .0731 TAR-PAMLICO RIVER ~~BASIN~~ NUTRIENT ~~SENSITIVE WATERS MANAGEMENT~~ STRATEGY: ~~BASINWIDE~~ STORMWATER ~~REQUIREMENTS~~

~~(a) PURPOSE.~~ ~~The purpose of this Rule~~ are as follows.~~is to achieve and maintain the nitrogen and phosphorus loading~~

~~reduction goals for the Tar-Pamlico River Estuary set out in Rule .0730 of this Section from an undeveloped condition on lands in the Tar-Pamlico River Basin on which new development occurs. Nothing in this Rule preempts local governments from implementing requirements that are more restrictive than those set forth in this Rule.~~

~~(1) To achieve and maintain a reduction in nitrogen loading to the Pamlico estuary from lands in the Tar-Pamlico River Basin on which new development occurs. The goal of this Rule is to achieve a 30 percent reduction relative to pre-development levels;~~

~~(2) To limit phosphorus loading from these lands to the estuary. The goal of this Rule is to limit phosphorus loading to pre-development levels;~~

~~(3) To provide control for peak stormwater flows from new development lands to ensure that the nutrient processing functions of existing riparian buffers and streams are not compromised by channel erosion; and~~

Commented [A100]: Change: Updated Purpose statement to clarify goal of this rule is to achieve reductions from new development and point to overall strategy reduction goals established in Rule .0730.

Effect: No substantive change. Improved clarity of rule purpose.

~~(4) To minimize, to the greatest extent practicable, nitrogen and phosphorus loading to the estuary from existing developed areas in the basin.~~

~~(b) APPLICABILITY. The following local governments shall implement the stormwater management requirements of this Rule. Municipalities shall implement this rule throughout their corporate limits and extraterritorial jurisdictions within the basin, while counties shall implement throughout their territorial jurisdictions within the basin. Counties named in this Item may implement this rule within municipalities not named in this Item in accordance with G.S. 160A-360(d).~~This Rule shall apply to local governments in the Tar-Pamlico basin according to the following criteria.

(1) Local governments designated under the original version of this Rule effective April 2001:~~This Rule shall apply to the following municipal areas:~~

(A) Greenville

(B) Henderson

(C) Oxford

(D) Rocky Mount

(E) Tarboro

(F) Washington

(G) Beaufort County

(H) Edgecombe County

(I) Franklin County

(J) Nash County

(K) Pitt County

(2) The Following additional local governments are subject to this Rule:~~This Rule shall apply to the following counties:~~

(A) Granville County ~~Beaufort~~

(B) Vance County ~~Edgecombe~~

Commented [A101]: Change: Added additional local governments to which the requirements of this rule shall apply based on assessment of growth by looking at overall populations and growth rate over the past 15 years. Added counties and municipalities with populations greater than 20K and 5K respectively that have a growth rate of approximately 200 or more people a year.

Effect: Improved coverage of rule requirements. Addresses holes in strategy coverage where larger and fast growing communities were previously left out of the original rule. These newly named local governments will be required to develop and adopt local programs including local ordinances to implement the rule requirements. Fiscal impact will be determined during the rulemaking process.

(C) Wilson County~~Franklin~~

(D) Nash

(E) Pitt

~~(3) The Environmental Management Commission may designate additional local governments as subject to this Rule by amending this Rule based on the potential of those jurisdictions to contribute significant nutrient loads to the Tar-Pamlico River. At a minimum, the Commission shall review the need for additional designations as part of the Basinwide process for the Tar-Pamlico River Basin. The Commission shall consider, at a minimum, the following criteria related to local governments: population within the basin, population density, past and projected growth rates, proximity to the estuary, and the designation status of municipalities within candidate counties.~~

(3) EXEMPTION. A stormwater management plan is not required for new development on an individual single-family lot if the development meets the following criteria:

(A) It is not part of a larger common plan of development or sale; and

(B) The project does not result in greater than 5 percent built upon area on the lot or it is for purposes of a single-family residence on a lot 5 acres in size or greater.

~~(c) LOCAL PROGRAM IMPLEMENTATION REQUIREMENTS. All local governments subject to this Rule shall~~ develop stormwater management programs for submission to and approval by the Commission according to the following minimum standards: ~~implement stormwater management programs approved by the Commission pursuant to the timeframes set out in Paragraph (c) of this Rule, or any subsequent modification to those plans approved by the Director, according to the following requirements and the standards contained in Paragraph (d) of this Rule:~~

(1) ~~A~~ The requirement ~~that a stormwater management plan~~ for local government approval of a stormwater plan for all proposed ~~new developments proposed within their jurisdictions.~~ new development projects disturbing one acre or more for single family and duplex residential property and recreational facilities, and one-half acre or more for commercial, industrial, institutional, multifamily residential, or local government property. Where proposed new development on an existing developed lot not part of a larger common plan of development results in built-upon area exceeding 24 percent, a stormwater plan addressing the new project area shall be required. ~~These stormwater plans shall not be approved by the subject local governments unless the following criteria are met:~~

Commented [A102]: Change: Provided exemption for individual single lot residential projects under a 5% BUA or of a certain size and not part of a larger common plan of development. Addition in response to stakeholder input and based on scenarios run using the latest accounting tool, projects meeting these criteria are assumed to already be meeting the required export rate targets.

Effect: Provides straightforward path for projects meeting these criteria to show compliance with the rule export targets without the cost of having to run export calculations and submitting a stormwater plan.

Commented [A103]: Change: Reorganized rule text to clearly state the requirements subject local governments must meet in their local implementation programs.

Effect: Provides clear separation between local government and developer requirements under the rule. Makes rule text current and clarifies that all local governments implementing programs continue to implement. Improved clarity. No substantive impact.

Commented [A104]: Change: Included land disturbance thresholds previously included in model program to provide information in one location.

Effect: Improved clarity and ease of finding information. No change in thresholds.

Commented [A105]: Change: Language added to address cumulative impacts in cases where small land disturbances add up over time to exceeded land disturbance thresholds that require a stormwater plan to be submitted.

Effect: Captures projects with cumulative impacts over land disturbance thresholds over time that would previously have been missed under the rule. Only requires the new BUA to be treated. Addresses loophole in previous rule language.

(2) A plan to ensure maintenance of stormwater control measures (SCMs) implemented to comply with this rule for the life of the development;

(3) A plan to ensure enforcement and compliance with the provisions in Paragraph (d) of this Rule for the life of the development;

(4) A public education program to inform citizens how to reduce nutrient pollution and to inform developers about the nutrient requirements set forth in Paragraph (d);

(5) A mapping program that includes major components of the municipal separate storm sewer system, waters of the State, land use types, and location of sanitary sewers; and

(6) A program to identify and remove illegal discharges.

(d) DEVELOPMENT PROJECT REQUIREMENTS. A proposed development project shall be approved by a subject local government for the purpose of this Rule when the applicable requirements of Paragraph (c) and the following criteria are met:

(A) The nitrogen load contributed by the proposed new development activity shall not exceed 70 percent of the average nitrogen load contributed by the non-urban areas in the Tar-Pamlico River basin based on land use data and nitrogen export research data. Based on 1995 land use data and available research, the nitrogen load value shall be 4.0 pounds per acre per year;

(B) The phosphorus load contributed by the proposed new development activity shall not exceed the average phosphorus load contributed by the non-urban areas in the Tar-Pamlico River basin based on land use data and phosphorus export research data. Based on 1995 land use data and available research, the phosphorus load value shall be 0.4 pounds per acre per year;

(C) The new development shall not cause erosion of surface water conveyances. At a minimum, the new development shall not result in a net increase in peak flow leaving the site from pre-development conditions for the 1-year, 24-hour storm event; and

(1) The project area, as defined in 15A NCAC 02H .1002, shall meet either a nitrogen loading rate target of 4.0 pounds/acre/year and a phosphorus loading rate target of 0.8 pounds/acre/year, or the definition of runoff volume match found in 15A NCAC 02H .1002. Except as otherwise stated in this paragraph, the project may meet the loading rate target through use of permanent nutrient offset credit pursuant to Rule .0703 of

Commented [A106]: Change: This language was moved up to this location from elsewhere in the rule.

Effect: Improved clarity concerning local government responsibilities.

Commented [A107]: Change: Reorganized this section to make it easier for the development community to identify the requirements their development projects need to meet.

Effect: Provides clear separation between local government and developer requirements under the rule. Improved Clarity.

Commented [A108]: Change: Updated this language to recognize there are multiple ways for a developer to meet runoff requirements for a proposed project including meeting the export rates targets as well as meeting the requirements through runoff volume match or the use of offsite nutrient offsets. Also added references to existing definitions in 2H rules for “project area” and runoff “volume match”

Effect: Improved clarity and added flexibility by providing multiple pathways for compliance.

Commented [A109]: Change: Increased phosphorus loading rate target from 0.4 to .08 lbs/acre/year based on additional science the Division has compiled since the rules were originally adopted regarding export rates from crop, pasture, and forest lands - which are used in developing the target export rate.

Effect: Phosphorus export rate target based on more recent science and better reflects actual loading rates and requires less treatment / offset credit and will also reduce cost of meeting the rule requirements.

this Section. Persons who seek nutrient offset credit to meet these requirements shall provide proof of nutrient offset credit acquisition to the permitting authority prior to approval of the development plan;

(2) Untreated nutrient loading rates from the project area shall be determined through the use of the tool most recently approved by the Division to have met the following criteria, or through an alternative method that meets the following criteria at least as well, as determined by the Division:

(A) Provides project site-scale estimates of annual precipitation-driven total nitrogen and total phosphorus load;

(B) From all land cover types on a project site at build-out;

(C) Based on land-cover-specific nitrogen and phosphorus loading coefficients and annual runoff volume; and

(D) Is supported by the weight of evidence from available, current, and applicable research.

(3) Nutrient loading rate reductions resulting from the use of SCMs shall be determined through the use of the tool most recently approved by the Division to have met the following criteria, or through an alternative method that meets the following criteria at least as well, as determined by the Division:

(A) Provides project site loading reduction estimates from the installation of DEMLR-approved SCMs;

(B) Reductions apply to the portion of the project area's runoff volume that is directed to the SCMs;

(C) The method partitions the runoff volume processed by the SCM among hydrologic fates and assigns nutrient concentrations to each of those fates; and

(D) The method is supported by the weight of evidence from available, current, and applicable research.

(4) Projects shall meet the requirements set forth in 15A NCAC 02H .1003. Projects that use SCMs to treat stormwater shall use the required storm depths and meet the SCM and density requirements set forth in the stormwater programs to which they are subject pursuant to Rules .1017, .1019, and .1021. Projects not subject to any of these rules

Commented [A110]: Change: Added requirement that only the most recently approved stormwater accounting tool (or Division approved equivalent) is to be used for calculating loading rates to ensure all developers and local governments are using the same accounting tool based on the most recent available data.

Effect: Provides improved consistency of rule implementation.

Commented [A111]: Change: Added requirement that only the most recently approved stormwater accounting tool (or Division approved equivalent) is to be used for calculating loadreductions to ensure all developers and local governments are using the same accounting tool based on the most recent available data.

Effect: Provides improved consistency of rule implementation.

Commented [A112]: Change: Added storm depth requirements for SCMs to be consistent with requirements in 2H stormwater rules.

Effect: Ensures proper SCM design and establishes consistency across stormwater rules

shall be considered high-density if they contain twenty four percent or greater built-upon area or have greater than two dwelling units per acre, and shall use a storm depth of one inch for SCM design.

(5) Proposed new development undertaken by a local government solely as a public road expansion or public sidewalk project or proposed new development subject to the jurisdiction of the Surface Transportation Board shall be exempt from the requirements of Sub-Paragraph (d)(4) of this Rule and may meet the loading rate targets through use of permanent nutrient offset credit pursuant to Rule .0703 of this Section;

(6) Proposed development projects that would replace or expand existing structures and would result in a net increase in built-upon area shall be responsible for nutrient loading from the area of disturbance less any preexisting built-upon area located in the disturbance area. The developer shall have the option to either achieve the percent loading reduction goals established in Rule .0730 of this Section or meet the loading rate targets of this Paragraph;

(7) Proposed new development projects may utilize an offsite SCM that is dedicated to treating an area encompassing the project provided the SCM complies with the applicable requirements of this Paragraph for the area that it treats;

(D) Developers shall have the option of partially offsetting their nitrogen and phosphorus loads by providing treatment of off-site developed areas. The off-site area must drain to the same classified surface water, as defined in the Schedule of Classifications, 15A NCAC 2B .0316, that the development site drains to most directly. The developer must provide legal assurance of the dedicated use of the off-site area for the purposes described here, including achievement of specified nutrient load reductions and provision for regular operation and maintenance activities, in perpetuity. The legal assurance shall include an instrument, such as a conservation easement, that maintains this restriction upon change of ownership or modification of the off-site property. Before using off-site treatment, the new development must attain a maximum nitrogen export of six pounds/acre/year for residential development and 10 pounds/acre/year for commercial or industrial development.

(8) Where pursuant to G.S. 153A-454 and G.S. 160A-459 a local government program does not review a development project proposed by a state or federal entity for the requirements of this Rule, the entity shall obtain Department review and approval; and

Commented [A113]: Change: In response to stakeholder input added option for local government road expansion and sidewalk projects that have limited or no space for SCMs to meet export targets entirely through the use of offsite nutrient offsets.

Effect: Provides flexibility and potentially more cost-effective ways for projects meeting these criteria to meet the requirements of the rule.

Commented [A114]: Change: Updated language addressing redevelopment scenarios per new definition of development in Session Law 2014-90 to make it clear that the area of disturbance minus any preexisting BUA must be treated when development replaces or expands existing development resulting in net increase in BUA.

Effect: Reduces the area and amount of treatment required under redevelopment scenarios. Aligns rule with session law.

Commented [A115]: Change: Based on stakeholder input added the option for developers to use "Regional" offsite SCMs to provide treatment for projects. This option may be particularly useful for municipalities with limited space for SCMs in downtown areas.

Effect: Provides an additional option and improved flexibility for meeting the requirements of this rule.

Commented [A116]: Change: Added language addressing enforcement of rule requirements by local governments on state and federal entities within their jurisdiction (in cases where they do not already have an NPDES permit).

Effect: Recognizes local governments have the authority to require state and federal entities to meet the requirements of their local stormwater ordinances. In cases where Local governments do not enforce these requirements the Division shall do so. Fiscal impact will be evaluated during the rulemaking process.

(9) Proposed new development shall demonstrate compliance with the riparian buffer protection requirements of Rule .0734 of this Section or subsequent amendments or replacement to those requirements.

~~(2) A public education program to inform citizens of how to reduce nutrient pollution and to inform developers about the nutrient and flow control requirements set forth in Part (c)(1).~~

~~(3) A mapping program that includes major components of the municipal separate storm sewer system, waters of the State, land use types, and location of sanitary sewers.~~

~~(4) A program to identify and remove illegal discharges.~~

~~(5) A program to identify and prioritize opportunities to achieve nutrient reductions from existing developed areas.~~

~~(6) A program to ensure maintenance of BMPs implemented as a result of the provisions in Subparagraphs (c)(1) and (c)(5).~~

~~(7) A program to ensure enforcement and compliance with the provisions in Subparagraph (c)(1).~~

~~(8) Local governments may include regional or jurisdiction-wide strategies within their stormwater programs as alternative means of achieving partial nutrient removal or flow control. At a minimum, such strategies shall include demonstration that any proposed measures will not contribute to degradation of surface water quality, degradation of aquatic or wetland habitat or biota, or destabilization of conveyance structure of involved surface waters. Such local governments shall also be responsible for including appropriate supporting information to quantify nutrient and flow reductions provided by these measures and describing the administrative process for implementing such strategies.~~

(e) RULE IMPLEMENTATION

(1) Within 4 months of the effective date of this Rule, the Division shall submit a model local stormwater program embodying the elements in Paragraphs (c) and (d) of this Rule to the Commission for approval. The Division shall work in cooperation with subject local governments in developing this model program.

(2) Local governments designated under the original version of this Rule effective April 2001 and additional local governments designated herein shall submit a local stormwater program for approval by the Commission within 6 months and 12 months, respectively, of the Commission's

Commented [A117]: Change: Moved expectation to demonstrate buffer rule compliance from model program.

Effect: Clarifies requirements addressed in local government programs. No Impact.

Commented [A118]: Change: This language was moved to Paragraph (c). Dropped the requirement for identifying stormwater retrofits based on stakeholder input.

Effect: Placement in Paragraph (c) provides better organization and clarity for local government responsibilities and elements to include in their local programs. Not change in implementation other than removing outdated and unnecessary requirement for identifying retrofit locations.

Commented [A119]: Change: Updated rule implementation timeline and added timeline for Division to develop model and new subject local governments to submit local programs.

Effect: Provides timeline for local governments who are added to this rule when they will be expected to begin implementing the requirements. Fiscal impact will be determined during the rulemaking process.

Commented [A120]: Change: Provide timelines for local governments to complete local programs allowing for more time for newly named communities.

Effect: Local governments that are already implementing will be provided 6 months to revise and submit their local programs. New subject communities will be provided more time – up to 12 months to develop and submit their programs for approval.

approval of the model local program. These local programs shall meet or exceed the requirements in Paragraphs (c) and (d) of this Rule.

(3) The Division shall provide recommendations to the Commission regarding proposed local programs. The Commission shall approve programs or require changes based on the standards set out in Paragraphs (c) and (d) of this Rule. Should the Commission require changes, the applicable local government shall have three months to submit revisions, and the Division shall provide follow-up recommendations to the Commission within two months after receiving revisions;

(4) Within six months after the Commission's approval of a local program, the affected local government shall complete adoption of and implement its local stormwater program.

(5) Local governments administering a stormwater program shall submit annual reports in electronic format to the Division documenting their progress regarding each implementation requirement in Paragraph (c) and net changes to nitrogen load by October 30 of each year. Annual reports shall also include as appendices all data utilized by nutrient calculation tools for each development stormwater plan approved in accordance with this Rule.

Commented [A121]:
Change: Added New Annual Reporting Language clarifying what needs to be included in the submittal.

Effect: Provides more useful information to the Division for tracking implementation and rule compliance

(6) Any significant modifications to a local government's program shall be submitted to the Director for approval.

(d) TIMEFRAME FOR IMPLEMENTATION. The timeframe for implementing the stormwater management program shall be as follows:

~~(1) Within 12 months of the effective date of this Rule, the Division shall submit a model local stormwater program that embodies the minimum criteria described in Paragraph (c) of this Rule to the Commission for approval. The Division shall work in cooperation with subject local governments in developing this model program.~~

~~(2) Within 12 months of the Commission's approval of the model local stormwater program or within 12 months of a local government's later designation pursuant to Subparagraph (b)(3), subject local governments shall submit their local stormwater management programs to the Commission for review and approval. These local programs shall meet or exceed the requirements in Paragraph (c) of this Rule.~~

~~(3) Within 18 months of the Commission's approval of the model local stormwater program or within 18 months of a local government's later designation pursuant to Subparagraph (b)(3),~~

~~subject local governments shall adopt and implement their approved local stormwater management program.~~

~~(4) Local governments administering a stormwater management program shall submit annual reports to the Division documenting their progress and net changes to nitrogen load by October 30 of each year.~~

(f) COMPLIANCE. A local government's authority to approve new development stormwater plans for compliance with this Rule pursuant to Paragraph (d) shall be contingent upon maintaining its own compliance with this rule. A local government that fails to submit an acceptable local stormwater ~~management~~ program within the timeframe established in this Rule, ~~or~~ fails to implement an approved program, or fails to comply with annual reporting requirements shall be in violation of this Rule. ~~In this case, the stormwater management requirements for its jurisdiction shall be administered through the NPDES municipal stormwater permitting program per 15A NCAC 2H .0126. Any local government that is subject to an NPDES municipal stormwater permit pursuant to this Rule shall:~~

~~(1) Develop and implement comprehensive stormwater management program to reduce nutrients from both existing and new development. This stormwater management program shall meet the requirements of Paragraph (c) of this Rule for new and existing development.~~

~~(2) Be subject to the NPDES permit for at least one permitting cycle (five years) before it is eligible to submit a local stormwater management program to the Commission for consideration and approval.~~

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-214.26; 143-215.1; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; 143B-282(d); S.L. 1997-458; S.L. 2006-246;*

Eff. April 1, 2001.

Amended Eff. [New Date]

Commented [A122]: Change: Added stronger language to deal with noncompliance of the rule requirements.

Effect: Clarifies expectations and potential recourse for noncompliance with the rule requirements.

15A NCAC 02B .0701 is proposed for adoption as follows:

15A NCAC 02B .0701 NUTRIENT STRATEGIES DEFINITIONS

~~Unless the context indicates otherwise, the following words and phrases shall be interpreted as follows for the purposes of this Section:~~

(1) "Agricultural uses" include the use of waters for stock watering, irrigation, and other farm purposes.

(2) "Allocation" means the mass quantity, as of nitrogen or phosphorus that a discharger, group of dischargers, or other source is potentially allowed to release into surface waters. Allocations may be expressed as delivered or discharge quantities. Possession of allocation does not authorize the discharge of nutrients but is prerequisite to such authorization in an NPDES permit.

(3) "Best Management Practice" means the same as defined in Rule .0202 of this Subchapter.

(4) "Buffer" means the same as defined in Rule .0202 of this Subchapter.

(5) "Built-upon area" means the same as defined in G.S. 143-214.7(b2).

(6) "Concentration(s)" means the same as defined in Rule .0202 of this Subchapter.

(7) "Contiguous" means the same as defined in Rule .0202 of this Subchapter.

(8) "Critical area" means the same as defined in Rule .0202 of this Subchapter.

(9) "Cropland" means agricultural land that is used for growing corn, grains, oilseed crops, cotton, forages, tobacco, beans, or other vegetables or fruits.

(10) "Delivered", as in delivered allocation, load, or limit, means that portion of the allocation, load, or limit that is measured or predicted to be transported from a nutrient source or discharge to a waterbody. A delivered value equals the corresponding discharge value multiplied by its assigned transport or delivery factor.

(11) "Development" means the same as defined in G.S. 143-214.7.

(12) "Director" means the Director of the Division.

Commented [A123]:
Change: Definitions for terms used in the Nutrient Management Strategy Rules were moved and combined into this new definitions rule so it will be easier to locate definitions for terms used in multiple rules in the .0700 Section.

Effect: Definitions easier to find. No impact on implementation

(13) "Discharge" as in discharge allocation, load, or limit means the allocation, load, or limit that is measured at the point of discharge into surface waters. A discharge value is equivalent to a delivered value divided by the transport factor for that discharge location.

(14) “Division” means the Division of Water Resources of the North Carolina Department of Environmental Quality and its successors.

(15) “DMS” means the N.C. Division of Mitigation Services or its successor.

(16) “Estuary allocation” means the mass loading of total nitrogen or total phosphorus at the estuary that is reserved for a discharger or group of dischargers. A discharger’s or group’s estuary allocation is equivalent to its discharge allocation multiplied by its assigned transport factor.

(17) “Existing development” means structures and other land modifications resulting from development activities, other than those associated with agricultural or forest management activities, that meet the following criteria:

(a) For projects that do not require a state permit, they are in place or have established a vested right to construct relative to the effective date of the applicable local stormwater ordinance implemented pursuant to a new development stormwater rule of this Section; and

(b) For projects that require a state permit, they are in place before the effective date established in the applicable state and federal entities stormwater rule of this Section.

(18) “Fertilizer” means the same as defined in Rule .0202 of this Subchapter.

(19) “Industrial discharge(s)” means the same as defined in Rule .0202 of this subchapter.

(20) “Land-disturbing activity” means the same as defined in Rule .0202 of this subchapter.

(21) "Load" means the mass quantity of a nutrient or pollutant released into surface waters over a given time period. Loads may be expressed in terms of pounds per year and may be expressed as "delivered load" or an equivalent "discharge load."

(22) “Load allocation” means the same as set forth in federal regulations 40 CFR 130.2(g), which is incorporated herein by reference, including subsequent amendments and editions. A copy of the most current version of the regulations is available free of charge on the internet at http://www.gpo.gov/fdsys/.

(23) “Local government” means the same as defined in Rule .0202 of this subchapter.

(24) "MGD" means million gallons per day.

(25) “Nitrogen” means total nitrogen unless specified otherwise.

(26) "Nonpoint source load allocation" is that portion of an approved TMDL or calibrated nutrient response model assigned to all other nitrogen sources in the basin other than individually permitted wastewater facilities and represents the maximum allowable load of total nitrogen or total phosphorus to a waterbody from these nonpoint sources.

(27) “Nonpoint source pollution” means the same as defined in Rule .0202 of this subchapter.

(28) “Non-wasting endowment” is a fund that generates enough interest to cover the cost of perpetual monitoring, maintenance, repair and renovation of a nutrient reduction project.

(29) "NPDES" means National Pollutant Discharge Elimination System, and connotes the permitting process required for the operation of point source discharges in accordance with the requirements of Section 402 of the Federal Water Pollution Control Act, 33 U.S.C. Section 1251 et seq.

(30) “Nutrients” means the combination of total nitrogen and total phosphorus for the purpose of the nutrient rules of this section.

(31) “Nutrient Offset Bank” is a nutrient reduction project that is implemented by a provider except DMS and approved by the Division for the purpose of generating nutrient offset credit.

(32) “Nutrient Offset Banking Instrument” is a written legal agreement between the Division and the provider that governs the establishment, operation, and use of a nutrient offset bank.

(33) “Nutrient Offset Project” is a nutrient reduction project that is implemented by DMS and approved by the Division for the purpose of generating nutrient offset credit.

(34) “Nutrient Reduction Practice” is any project type or type of programmatic effort that generates a quantifiable or estimated decrease in nutrient loading, and for which practice design standards and load reduction estimation methods have been approved in rule or by the Division.

(35) “Nutrient Reduction Project” is a site-specific installation and implementation of a nutrient reduction practice or combination of practices.

(36) “Nutrient Sensitive Waters” means the same as defined or classified in Rule .0223 of this subchapter.

(37) “Permanent Nutrient Offset Credit” is a nutrient load reduction credit that is generated in compliance with this rule. Permanent nutrient offset credits account for permanent nutrient load reductions resulting from permanently installed and maintained nutrient reduction practices. Permanent nutrient offset credits may be used for compliance with new development stormwater rules of this Subchapter and may also satisfy other nutrient load reduction requirements as described in this Subchapter. Nutrient offset credits are expressed in pounds of total nitrogen or total phosphorus per year.

(38) “Phosphorus” means total phosphorus unless specified otherwise.

(39) “Provider” means any public or private person or entity that implements a nutrient reduction project and seeks nutrient offset credit for sale, lease, or conveyance in exchange for remuneration, including DMS. Persons or entities other than DMS that seek to become a provider of nutrient offset credits become so upon approval of a nutrient offset banking instrument by the Division.

(40) “Residuals” means the same as defined in Rule .0202 of this subchapter.

(41) “Stormwater Collection System” means the same as defined in 15A NCAC 02H .1002.

(42) “Stormwater Control Measure” or “SCM,” also known as “Best Management Practice” or “BMP,” means the same as defined in 15A NCAC 02H .1002.

(43) "Surface waters" means all waters of the state as defined in G.S. 143-212 except underground waters.

(44) “Term Nutrient Offset Credit” is a nutrient load reduction credit that accounts for annual nutrient load reductions. Temporary nutrient offset credits are expressed in pounds of total nitrogen or total phosphorus.

(45) "Total Maximum Daily Load," or "TMDL," means the same as set forth in federal regulations 40 CFR 130.2(i) and 130.7(c)(1), which are incorporated herein by reference, including subsequent amendments and editions. A copy of the most current version of the regulations is available free of charge on the internet at http://www.gpo.gov/fdsys/.

(46) "Total nitrogen" means the sum of the organic, nitrate, nitrite, and ammonia forms of nitrogen in a water or wastewater.

Commented [A124]: NRCA May 2018 change: Definition of “Provider” revised to apply only to parties selling or leasing nutrient offset credits.

Effect: This provision omits a regulated entity seeking to self-generate offset credits from the definition of "provider" since, in that situation, credits would be utilized for direct regulatory compliance purposes instead of being sold "for remuneration." Now, not being providers, they would be barred from generating nutrient offset credits under the Nutrient Offset rule. Related, this result also introduces a conflict with paragraphs (k) and (l) of the Nutrient Offset rule, which govern the self-generation of offset credits for use by developers and NPDES permittees.

Commented [A125]: Change: Deleted definition for “Residential Development” as this term no longer appears in the proposed revisions to the Neuse and Tar-Pamlico Rules.

Effect: No substantive impact.

Commented [A126]: Change: Revised “Temporary Nutrient Offset Credit” which is a term no longer used in the Nutrient Offset Rule to “Term Nutrient Offset Credit”.

Effect: No substantive impact.

Commented [A127]: NRCA May 2018 Change: Deleted clarification sentence stating that credits generated under the existing version of the Nutrient Offset rule are temporary in nature.

Effect: No substantive impact.

(47) "Total phosphorus" means the sum of the orthophosphate, polyphosphate, and organic forms of phosphorus in a water or wastewater.

(48) “Transportation facility” means the existing road surface, road shoulders, fill slopes, ferry terminal fill areas, and constructed stormwater conveyances or drainage canals adjacent to and directly associated with the road.

(49) "Transport factor" means the fraction of a discharged nitrogen or phosphorus load that is delivered from the discharge point to a waterbody as established in an approved TMDL or other Division publication.

(50) “Wasteload allocation” is that portion of a nitrogen or phosphorus TMDL assigned to individually permitted wastewater facilities and represents the maximum allowable load of total nitrogen or total phosphorus to the estuary from these point source dischargers.

History Note: *Authority G.S. 143-214.1; 1432-214.3;143-214.5; 143-214.7; 143-215.1; 143215.3; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; 143-215.8B; 143B-282(c); 143B-282(d);*

Eff. [Date].

15A NCAC 02B .0730 is proposed as follows:

15A NCAC 02B .0730 TAR-PAMLICO NUTRIENT STRATEGY: PURPOSE & SCOPE

~~PURPOSE. The purpose of this Rule and Rules 15A NCAC 02B .0731 through .0736 is to attain the designated uses of the Pamlico River estuary with respect to meeting nutrient-related water quality standards pursuant to the Environmental Management Commission's authority under the Clean Water Responsibility and Environmentally Sound Policy Act enacted by the North Carolina General Assembly in 1997 and other authorities. The estuary and waters of the Tar-Pamlico River Basin are classified as Nutrient Sensitive Waters (NSW) pursuant to 15A NCAC 02B .0101(e)(3) and 15A NCAC 02B .0223. The rules enumerated in Item (3) of this Rule together constitute the Tar-Pamlico nutrient strategy, and shall be implemented in accordance with 15A NCAC 02B .0223. This rule establishes the framework of the Tar-Pamlico nutrient strategy:~~

~~(1) SCOPE AND LIMITATION. The Tar-Pamlico nutrient strategy rules require controls to reduce nitrogen and phosphorus loads from significant sources of these nutrients throughout the Tar-Pamlico Basin. These Rules do not address sources for which there is insufficient scientific knowledge to base regulation. The Commission may undertake additional rulemaking in the future or make recommendations to other rulemaking bodies as deemed appropriate to more fully address nutrient sources to the Pamlico River Estuary.~~

~~(2) GOALS. To achieve the purpose of the Tar-Pamlico nutrient strategy, the Commission established in the initial Tar-Pamlico nutrient rules, enacted in 2000 and 2001, goals of reducing the average annual load of nitrogen delivered to the Pamlico River Estuary from nutrient sources to a level 30 percent below a 1991 baseline, and thereafter maintaining it at or below that level, and of reducing average annual phosphorus load to 1991 baseline level and thereafter maintaining it at or below that level. This Tar-Pamlico nutrient strategy continues these goals.~~

(3) RULES ENUMERATED. The rules of the Tar-Pamlico nutrient strategy are titled as follows:

(a) Rule .0730 Purpose and Scope;

(b) Rule .0731 Stormwater Management for New Development;

(c) Rule .0732 Agriculture;

(d) Rule .0733 Non-Association Dischargers

(e) Rule .0734 Riparian Buffer Protection; and

Commented [A128]: Note: This is a new rule proposed for the Tar-Pamlico Nutrient Strategy. It is added to be consistent with the other nutrient management strategies that have similar rules in place to explain the overall purpose, scope, and geographic applicability of the nutrient strategy requirements. It provides a list of the rules that make up the strategy and the overall reduction goal to be achieved.

Effect: Adds clarity to purpose of the nutrient management strategy, provides for adaptive management in implementation and will result in biannual reports from the Division to the WQC on implementation progress.

Commented [A129]: Note: Statement on what sources are addressed under the rules and the Commissions ability to undertake additional rulemaking.

Effect: No Impact

Commented [A130]: Note: Statement providing the overall strategy nitrogen and phosphorus reduction goals.

Effect: No Impact

Commented [A131]: Note: Provides updated Rule References to point to new .0700 Rule numbers

Effect: No Impact

(f) Rule .0735 Buffer Program Delegation;

(4) ADAPTIVE MANAGEMENT. Given ongoing impairment of the Pamlico estuary more than a decade following full implementation of the above rules, the Division is pursuing fuller evaluation of the basin's nutrient dynamics to inform and guide adaptive management. Evaluation shall seek to utilize all sources of available information, including stakeholder input, and shall consider drivers, character and shifts in the impairment with time, trends and character of loading delivered to the estuary, and distribution and character of loading inputs to the basin and changes to those inputs over time. Evaluation shall address the extent to which the reduction goals identified above have been achieved and shall, based on its findings, provide recommendations on management needs. The Division shall seek to complete an evaluation within three years of the effective date of this rule and shall distribute its findings, which may recommend regulatory and non-regulatory actions, upon completion. The Division shall also report biannually to the Water Quality Committee of the Commission on implementation progress and reductions achieved by sources subject to the Tar-Pamlico nutrient strategy. The adaptive management approach is based on defined goals, knowledge of resources and impacts to those resources, appropriate technology and inventory. These inputs are used to plan, act, monitor and evaluate. The process is iterative and the goal is continuous environmental quality improvement.

(5) GEOGRAPHIC APPLICABILITY. The Tar-Pamlico nutrient strategy shall apply in all areas draining to waters within hydrologic units 03020101, 03020102, 03020103, 03020104, and portions of 03020105 located on the Albemarle-Pamlico peninsula unless individual Tar-Pamlico strategy rules describe other boundaries.

~~(6) PENALTIES. Failure to meet requirements of Rules the Tar-Pamlico nutrient strategy may result in imposition of enforcement measures as authorized by G.S. 143-215.6A (civil penalties), G.S. 143-215.6B (criminal penalties), and G.S. 143-215.6C (injunctive relief).~~

History Note: *Authority G.S. 143-214.1; 143-214.7; 143-215.3(a)(1); 143-215.6A; 143-215.6B; 143-215.6C; 143-282(d); S.L. 1997-458;*

Eff. [New Date].

Commented [A132]: Note: Includes adaptive management language recognizing the ongoing water quality issues in the estuary and the availability of more information to evaluate implementation as time goes on. Establishes date by which evaluation would be completed and recommendations made. Added requirement for Division to report to the WQC biannually on implementation progress.

Effect: Provides for better tracking of progress and ability for management strategy to be modified based on evaluation of additional data and strategy effectiveness.

Commented [A133]: Note: Includes explanation of geographic area to which the Tar-Pamlico nutrient strategy rules apply.

Effect: Provides better clarity on areas subject to the rules. Omits Ocracoke Island, small portions of Core Banks, and portions of Carteret County including Cedar Island, Atlantic, and Sea level from the geographic area subject to the Tar-Pamlico buffer and agriculture rule requirements. There is no indication of nutrient impairment in these omitted areas that are disconnected from the Ta-Pamlico Estuary TMDL.

Commented [A134]: Note: Statement addressing potential consequences of note meeting the requirements of the rules. Consistent with purpose & scope rule language in other nutrient strategies.

Effect: No Impact